HWMA STORAGE and TREATMENT PERMIT for the IDAHO NUCLEAR TECHNOLOGY and ENGINEERING CENTER and the RADIOACTIVE WASTE MANAGEMENT COMPLEX on the IDAHO NATIONAL LABORATORY

EPA ID NO. ID4890008952

Effective Date: April 27, 2009
Revision Date: December 20, 2019
Book 2 of 3
APPENDIX 1

Debris Treatment Processes
Holdup and Collection Tanks
CPP-659/-1659 Storage
CPP-666 FDP Cell Container Storage and Slab Tank Storage
Other Miscellaneous Treatment Processes
RMWSF (CPP-1617) Container Storage Area and CPP-2725

FACILITY PHOTOGRAPHS

Revision Date: March 29, 2017
<table>
<thead>
<tr>
<th>Page Number</th>
<th>Photo Number</th>
<th>Description of Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PN-96-98-1-5</td>
<td>CPP-1659 Exterior Looking North East</td>
</tr>
<tr>
<td>2</td>
<td>PN-96-98-1-0</td>
<td>Vehicle Entry CPP-659 Room 417 Looking East</td>
</tr>
<tr>
<td>3</td>
<td>PN-99-0082-1-15</td>
<td>Decontamination Sinks Enclosure CPP-659 Looking South East</td>
</tr>
<tr>
<td>4</td>
<td>PN-99-0082-1-17</td>
<td>Decontaminations Sinks Enclosure CPP-659 Room 415 Looking East</td>
</tr>
<tr>
<td>5</td>
<td>PN-99-0082-1-24</td>
<td>Entrance into Decontamination Sinks Enclosure CPP-659 Room 415 Looking East</td>
</tr>
<tr>
<td>6</td>
<td>PN-96-243-1-30</td>
<td>Decontamination Sinks CPP-659 Room 415 Looking South East</td>
</tr>
<tr>
<td>7</td>
<td>PN-96-243-1-35</td>
<td>Interior Decontamination Sinks Enclosure CPP-659 Room 415 Looking South</td>
</tr>
<tr>
<td>8</td>
<td>PN-96-243-1-31</td>
<td>Ultrasonic Cleaner Sink CPP-659 Room 415 Looking South</td>
</tr>
<tr>
<td>9</td>
<td>PN-96-98-2-28</td>
<td>Low-Level Decontamination Shielded Storage CPP-659 Room 415 Looking South</td>
</tr>
<tr>
<td>10</td>
<td>PN-99-0082-1-25</td>
<td>Curb Around Chemical Make-up Tanks CPP-659 Room 415 Looking North West</td>
</tr>
<tr>
<td>11</td>
<td>No Photo Number Available</td>
<td>VAC PAC (w/o Head and Hose)</td>
</tr>
<tr>
<td>12</td>
<td>PN-96-0098-2-17</td>
<td>Exterior Steam Spray Booth (w/o Glove Box) CPP-659 Room 418 Looking North West</td>
</tr>
<tr>
<td>13</td>
<td>PN-96-243-1-12</td>
<td>Interior Steam Spray Booth (w/o False Floor) CPP-659 Room 418 Looking South</td>
</tr>
<tr>
<td>14</td>
<td>PN-99-0082-1-3</td>
<td>Exterior Steam Spray Booth (w/Glove Box) CPP-659 Room 418 Looking North West</td>
</tr>
<tr>
<td>15</td>
<td>PN-99-0082-1-10</td>
<td>Interior Steam Spray Booth w/False Floor) CPP-659 Room 418 Looking South</td>
</tr>
<tr>
<td>Page Number</td>
<td>Photo Number</td>
<td>Description of Photo</td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>16</td>
<td>PN-99-0082-1-7</td>
<td>Glove Box CPP-659 Room 418 Looking North West</td>
</tr>
<tr>
<td>17</td>
<td>PN-99-0082-1-8</td>
<td>Glove Box CPP-659 Room 418 Looking South West</td>
</tr>
<tr>
<td>18</td>
<td>PN-81-4767</td>
<td>Valve Cubicle CPP-659 Looking West</td>
</tr>
<tr>
<td>19</td>
<td>PN-96-98-1-19</td>
<td>Filter Cell CPP-659 Looking South</td>
</tr>
<tr>
<td>20</td>
<td>PN-81-4278</td>
<td>CPP-659 Room 308 Overhead Crane and Room 323 Hatch Covers Looking East</td>
</tr>
<tr>
<td>21</td>
<td>PN-82-5127</td>
<td>Looking at a transfer into CPP-659 Room 309 from the Crane Maintenance and Transfer Area Room 323</td>
</tr>
<tr>
<td>22</td>
<td>PN-96-85-1-12</td>
<td>CPP-659 HEPA Filter Leaching System Room 309 Looking South</td>
</tr>
<tr>
<td>23</td>
<td>PN-82-5131</td>
<td>CPP-659 Room 308 Decontamination Cell Looking West</td>
</tr>
<tr>
<td>24</td>
<td>PN-96-98-1-7</td>
<td>CPP-666 FAST Building Exterior Looking South East</td>
</tr>
<tr>
<td>25</td>
<td>PN-96-84-1-9</td>
<td>CPP-666 FDP Cell Container Storage -13’-0’ Level Looking East</td>
</tr>
<tr>
<td>26</td>
<td>1617-16</td>
<td>RMWSF Main Gate CPP-1617 Storage Area Looking South</td>
</tr>
<tr>
<td>27</td>
<td>1617-01</td>
<td>RMWSF Inside CPP-1617 Temporary Structure Looking East</td>
</tr>
<tr>
<td>28</td>
<td>1617-11</td>
<td>RMWSF Mixed Waste Storage Boxes Paved Area Looking North East</td>
</tr>
<tr>
<td>29</td>
<td>98-546-2-2</td>
<td>RMWSF High Radiation Storage Area with Radioactive and Mixed Waste Boxes (with covers) Paved Area Looking East</td>
</tr>
<tr>
<td>30</td>
<td>1617-14</td>
<td>RMWSF Cargo Containers Paved Area Looking North</td>
</tr>
<tr>
<td>31</td>
<td>89-566-1-15</td>
<td>RMWSF CPP-1617 Exterior Looking North East</td>
</tr>
<tr>
<td>32</td>
<td>1617-07</td>
<td>RMWSF CPP-1617 Building Looking North West</td>
</tr>
<tr>
<td>Page Number</td>
<td>Photo Number</td>
<td>Description of Photo</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>33</td>
<td>95-1015-1-8</td>
<td>RMWSF Interior Cargo Container, Drip Pan, Inspector, and Liquid Waste Electric Base Board Heater Lower Left Looking West</td>
</tr>
<tr>
<td>34</td>
<td>1617-09</td>
<td>RMWSF Heated Cargo Containers Paved Area Looking South West</td>
</tr>
<tr>
<td>35</td>
<td>ILTSF 003.jpg</td>
<td>External View of an Interim Storage Container</td>
</tr>
<tr>
<td>36</td>
<td>ILTSF 001.jpg</td>
<td>View of Empty Interim Storage Container</td>
</tr>
<tr>
<td>37</td>
<td>ILTSF 005.jpg</td>
<td>Example of Shielded Overpack Container</td>
</tr>
<tr>
<td>38</td>
<td>N/A</td>
<td>RH TRU Cask Loading Platform</td>
</tr>
<tr>
<td>39</td>
<td>N/A</td>
<td>RH TRU Removable Lid Container (RLC) Inspection Stand (empty)</td>
</tr>
<tr>
<td>40</td>
<td>N/A</td>
<td>RH TRU Cask Loading and RLC Inspection Areas</td>
</tr>
<tr>
<td>41</td>
<td>N/A</td>
<td>RH TRU View of Overhead Crane</td>
</tr>
<tr>
<td>42</td>
<td>N/A</td>
<td>RH TRU RLC Inspection Station with Empty RLC</td>
</tr>
<tr>
<td>43</td>
<td>N/A</td>
<td>RH TRU RLC with Lid Removed and Placed on Lid Inspection Stand</td>
</tr>
<tr>
<td>44</td>
<td>N/A</td>
<td>RH TRU Personnel Operating Station</td>
</tr>
<tr>
<td>45</td>
<td>N/A</td>
<td>RH TRU Lag Storage Rack</td>
</tr>
<tr>
<td>46</td>
<td>N/A</td>
<td>RH TRU Cask Storage Rack and Impact Limiter Staging Stand (both empty)</td>
</tr>
<tr>
<td>47</td>
<td>N/A</td>
<td>RH TRU Funnel for Loading Inserts into Casks</td>
</tr>
<tr>
<td>48</td>
<td>N/A</td>
<td>RH TRU Transport Trailer with 72B Shipping Cask</td>
</tr>
<tr>
<td>49</td>
<td>N/A</td>
<td>RH TRU Decon Cell with Repackaged Drum</td>
</tr>
<tr>
<td>Page Number</td>
<td>Photo Number</td>
<td>Description of Photo</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>50</td>
<td>N/A</td>
<td>RH TRU Decon Cell with Turntable/Sorting Table with Downdraft Repackage Waste Container</td>
</tr>
<tr>
<td>51</td>
<td>N/A</td>
<td>RH TRU Crane Maintenance and Transfer Area (Room 323)</td>
</tr>
<tr>
<td>52</td>
<td>N/A</td>
<td>RH TRU Real-Time Radiography (RTR) Access Port into Room 306</td>
</tr>
<tr>
<td>53</td>
<td>N/A</td>
<td>RH TRU RTR Equipment</td>
</tr>
<tr>
<td>54</td>
<td>N/A</td>
<td>RH TRU Decontamination Access Tent into Remote Decon Cell (Room 308)</td>
</tr>
<tr>
<td>55</td>
<td>N/A</td>
<td>RH TRU Port Cover over Remote Decon Cell (Room 308) located in Decontamination Access Tent</td>
</tr>
<tr>
<td>56</td>
<td>N/A</td>
<td>RH TRU Shielded Operating Area in the Equipment Decon Room</td>
</tr>
<tr>
<td>57</td>
<td>N/A</td>
<td>RH TRU Equipment Decon Room (418) Overpack Area - 55-gallon Waste Drum</td>
</tr>
<tr>
<td>58</td>
<td>N/A</td>
<td>Argon Repackaging Station (ARS) unit for use in CPP-659 Room 308</td>
</tr>
<tr>
<td>59</td>
<td>N/A</td>
<td>ARS unit showing a lexan wall with a drum out port. The wall is replaceable with either a wall with a drum out port or a solid wall. The ARS unit will be installed in CPP-659, Room 308</td>
</tr>
<tr>
<td>60</td>
<td>N/A</td>
<td>ARS 1 unit prior to installation into the CPP-666 FDP Cell</td>
</tr>
<tr>
<td>61</td>
<td>N/A</td>
<td>ARS 2 unit prior to installation into the CPP-666 FDP Cell</td>
</tr>
<tr>
<td>62</td>
<td>N/A</td>
<td>ARS 2 unit with empty waste containers prior to installation into the CPP-666 FDP Cell</td>
</tr>
<tr>
<td>Page Number</td>
<td>Photo Number</td>
<td>Description of Photo</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>63</td>
<td>20161201_140323</td>
<td>Interior of Building CPP-2725 looking North</td>
</tr>
<tr>
<td>64</td>
<td>20161201_140445</td>
<td>Exterior of Building CPP-2725 from the South</td>
</tr>
<tr>
<td>65</td>
<td>20161201_140618</td>
<td>Exterior of Building CPP-2725 from the Southwest corner</td>
</tr>
</tbody>
</table>
CPP-1659 Exterior
Looking North East

PN-96-98-1-5
Vehicle Entry
CPP-659 Room 417
Looking East

PN-96-98-1-0
Decontamination Sinks Enclosure
CPP-659
Looking South East

PN 99-0082-1-15
Decontamination Sinks Enclosure
CPP-659 Room 415
Looking East

PN-99-0082-1-17
Entrance into Decontamination Sinks Enclosure  
CPP-659 Room 415  
Looking East  

PN-99-0082-1-24
Decontamination Sinks
CPP-659 Room 415
Looking South East

PN-96-243-1-30
Interior Decontamination Sinks Enclosure
CPP-659 Room 415
Looking South

PN-96-243-1-35
Ultrasonic Cleaner Sink
CPP-659 Room 415
Looking South
PN-96-243-1-31
Low-Level Decontamination Shielded Storage
CPP-659 Room 415
Looking South

PN-96-96-2-28
Curb Around Chemical Make-up Tanks
CPP-659 Room 415
Looking North West

PN-99-0082-1-25
VAC PAC System (w/o Head and Hose)

(Photocopy)
Exterior Steam Spray Booth (w/o Glove Box)
CPP-659 Room 418
Looking North West

PN-96-0098-2-17
Interior Steam Spray Booth (w/o false floor)
CPP-659 Room 418
Looking South

PN-96-243-1-12
Exterior Steam Spray Booth (w/Glove Box)
CPP-659 Room 418
Looking North West

PN-99-0082-1-3
Interior Steam Spray Booth (w/False floor)
CPP-659 Room 418
Looking South

PN-99-0082-1-10
Glove Box
CPP-659 Room 418
Looking North West

PN-99-0082-1-7
Glove Box
CPP-659 Room 418
Looking South West

PN-99-0082-1-8
Valve Cubicle
CPP-659
Looking West
PN-81-4767
Filter Cell
CPP-659
Looking South

PN-96-98-1-19
CPP-659 Room 308 Overhead Crane and Room 323 Hatch Covers
Looking East

PN-81-4278
Looking at a transfer into CPP-659 Room 308
from the Crane Maintenance and Transfer Area Room 323

PN-82-5127
CPP-659 HEPA Filter Leaching System
Room 309
Looking South

PN-96-85-1-12
CPP-659 Room 308
Decontamination Cell
Looking West

PN-82-5131
CPP-666 FAST Building Exterior
Looking South East

PN-96-98-1-7
CPP-666 FDP Cell Container Storage
-13'-0' Level
Looking East

PN-96-84-1-9
03-06-02
RMWSF
Main Gate CPP-1617
Storage Area
Looking South

Photo number: 1617-16
03-06-02
RMWSF
Inside CPP-1617
Temporary Structure
Looking East

Photo Number: 1617-01
03-06-02
RMWSF
Mixed Waste Storage Boxes
Paved Area
Looking North East

Photo Number: 1617-11
9-29-98
RMWSF
High Radiation Storage Area with Radioactive and Mixed Waste Boxes (with covers)
Paved Area
Looking East

Photo Number: 98-546-2-2
03-03-02
RMWSF
Cargo Containers
Paved Area
Looking North

Photo Number: 1617-14
1989
RMWSF
CPP-1617 Exterior
Looking North East

Photo Number: 89-566-1-15
03-06-02
RMWSF
CPP-1617 Building
Looking North West

Photo Number: 1617-07
1995
RMWSF
Interior Cargo Container, Drip Pan, Inspector, and Liquid Waste
Electric Base Board Heater Lower Left
Looking West

Photo Number: 95-1015-1-8
03-06-02
RMWSF
Heated Cargo Containers
Paved Area
Looking South West

Photo Number: 1617-09
06-07-04
External View of an Interim Storage Container

Photo Number: ILSTF 003.jpg
06-07-04
View of Empty Interim Storage Container

Photo Number: ILTSF 001.jpg
09-23-04
Example of Shielded Overpack Container

Photo Number: ILTSF 005.jpg
01-21-09
RH TRU Cask Loading Platform
CPP-659, Room 428

Photo Number: N/A
01-21-09
RH TRU Removable Lid Container (RLC) Inspection Stand (empty)
CPP-659, Room 428

Photo Number: N/A
01-21-09
RH TRU Cask Loading and RLC Inspection Areas
CPP-659, Room 428

Photo Number: N/A
01-21-09
RH TRU View of Overhead Crane
CPP-659, Room 428 Looking West

Photo Number: N/A
01-21-09
RH TRU RLC Inspection Station with Empty RLC
CPP-659, Room 428

Photo Number: N/A
01-21-09
RH TRU RLC with Lid Removed and Placed on Lid Inspection Stand
CPP-659, Room 428

Photo Number: N/A
01-21-09
RH TRU Personnel Operating Station
CPP-659, Room 428

Photo Number: N/A
01-21-09
RH TRU Lag Storage Rack
CPP-659, Room 428

Photo Number: N/A
01-21-09
RH TRU Cask Storage Rack and Impact Limiter Staging Stand (both empty)
CPP-659, Room 428

Photo Number: N/A
01-21-09
RH TRU Funnel for Loading Inserts into Casks
CPP-659, Room 428

Photo Number: N/A
01-21-09
RH TRU Transport Trailer with 72B Shipping Cask
Located east of CPP-659

Photo Number: N/A
01-21-09
RH TRU Decon Cell with Repackaged Drum
CPP-659, Room 208

Photo Number: N/A
01-21-09
RH TRU Decon Cell with Turntable/Sorting Table with Downdraft Repackage Waste Container
CPP-659, Room 208

Photo Number: N/A
01-21-09
RH TRU Crane Maintenance and Transfer Area
CPP-659, Room 323

Photo Number: N/A
01-21-09
RH TRU Real-Time Radiography (RTR) Access Port into Room 306
CPP-659, Room 418

Photo Number: N/A
01-21-09
RH TRU RTR Equipment
CPP-659, Room 306

Photo Number: N/A
01-21-09
RH TRU Decontamination Access Tent into Remote Decon Cell (Room 308)
CPP-659, Room 418

Photo Number: N/A
01-21-09
RH TRU Port Cover over Remote Decon Cell (Room 308) located in Decontamination Access Tent
CPP-659, Room 418

Photo Number: N/A
01-21-09
RH TRU Shielded Operating Area in the Equipment Decon Room
CPP-659, Room 418

Photo Number: N/A
01-21-09
RH TRU Equipment Decon Room (418) Overpack Area -55-gallon Waste Drum
CPP-659, Room 418

Photo Number: N/A
04-09-2015
Argon Repackaging Station (ARS) unit for use in CPP-659 Room 308
04-09-2015
ARS unit showing a lexan wall with a drum out port. The wall is replaceable with either a wall with a drum out port or a solid wall.
The ARS unit will be installed in CPP-659, Room 308
ARS 1 Unit Prior to installation into the CPP-666 FDP Cell
ARS 2 unit prior to installation into the CPP-666 FDP Cell
ARS 2 setup with empty waste containers prior to installation into the CPP-666 FDP Cell
12-01-16
Interior of Building CPP-2725 looking North
Photo Number: 20161201_140323
12-01-16
Exterior of Building CPP-2725 from the South

Photo Number: 20161201 _140445
12-01-16
Exterior of Building CPP-2725 from the Southwest corner

Photo Number: 20161201_140618
HWMA/RCRA PART B PERMIT
FOR THE IDAHO NATIONAL LABORATORY

Volume 18 – Idaho Nuclear Technology and Engineering Center

APPENDIX 2

Debris Treatment Processes
Holdup and Collection Tanks
CPP-659/-1659 Storage
CPP-666 FDP Cell Container Storage and Slab Tank Storage
Other Miscellaneous Treatment Processes
RMWSF (CPP-1617) and CPP-2725

FACILITY DRAWINGS

Revision Date: May 17, 2018
## DRAWING LIST

<table>
<thead>
<tr>
<th>Drawing Number</th>
<th>Revision Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>056381</td>
<td>22</td>
<td>CPP Piping &amp; Instrument Legend, Symbols &amp; Abbreviations</td>
</tr>
<tr>
<td>142644</td>
<td>3</td>
<td>Fluorinel and Storage Facility Mechanical Process Legend &amp; Symbols</td>
</tr>
<tr>
<td>132378</td>
<td>2</td>
<td>3rd Level Floor Slab Plan No. 3 Calcining Area</td>
</tr>
<tr>
<td>132464</td>
<td>6</td>
<td>1st Level Floor &amp; FDN Plan Decontamination Area</td>
</tr>
<tr>
<td>132545</td>
<td>1</td>
<td>Decon. Coll.Tank &amp; Pump Cells Wall Sections Calcining Area</td>
</tr>
<tr>
<td>132797</td>
<td>1</td>
<td>Item No. VES-NCD-123 Decontamination Area Hold-Up Tk. Decon Area</td>
</tr>
<tr>
<td>132799</td>
<td>1</td>
<td>Item No. VES-NCD-129 Collection Tank Decon Area</td>
</tr>
<tr>
<td>133399</td>
<td>12</td>
<td>Utility Flow Diagram Process &amp; Utility Drain Line @ Levels No, 1, 2, &amp; 3, NWCF</td>
</tr>
<tr>
<td>133400</td>
<td>9</td>
<td>Utility Flow Diagram Process &amp; Utility Drain Lines @ Levels No 1, 2, 3, NWCF</td>
</tr>
<tr>
<td>133401</td>
<td>12</td>
<td>Utility Flow Diagram Process &amp; Utility Drain Lines @ Levels No 1, 2, 3, NWCF</td>
</tr>
<tr>
<td>133402</td>
<td>11</td>
<td>Utility Flow Diagram Process &amp; Utility Drain Lines @ Levels No 1, 2, 3, NWCF</td>
</tr>
<tr>
<td>133408</td>
<td>28</td>
<td>Mechanical P&amp;ID Hot Sump Tanks Cell, NWCF</td>
</tr>
<tr>
<td>133409</td>
<td>31</td>
<td>Mechanical P&amp;ID Hot Sump Tanks Cell, NWCF</td>
</tr>
<tr>
<td>133443</td>
<td>23</td>
<td>Mechanical Flow Diagram Decontamination Area, NWCF</td>
</tr>
<tr>
<td>133444</td>
<td>20</td>
<td>Mechanical Flow Diagram Decontamination Area, NWCF</td>
</tr>
<tr>
<td>133445</td>
<td>23</td>
<td>Mechanical Flow Diagram Decontamination Area, NWCF</td>
</tr>
<tr>
<td>133446</td>
<td>23</td>
<td>Mechanical Flow Diagram Decontamination Area, NWCF</td>
</tr>
<tr>
<td>133447</td>
<td>28</td>
<td>Mechanical Flow Diagram Decontamination Area, NWCF</td>
</tr>
<tr>
<td>133448</td>
<td>28</td>
<td>Mechanical Flow Diagram Decontamination Area, NWCF</td>
</tr>
<tr>
<td>134621</td>
<td>2</td>
<td>Stainless Steel Floor Liner Plate Installation Floor Plan No. 3 Decon Area, NWCF</td>
</tr>
<tr>
<td>Drawing Number</td>
<td>Revision Number</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>444389</td>
<td>7, Sheet P-3</td>
<td>HEPA Filter Leach System Process and Instrumentation Diagram</td>
</tr>
<tr>
<td>444390</td>
<td>3, Sheet P-4</td>
<td>Modifications to HEPA Filter Leach System Piping Plan</td>
</tr>
<tr>
<td>097870</td>
<td>3</td>
<td>CPP-659 NWCF Truck Bay Decon Spray Booth DSB-NC-601 P&amp;ID</td>
</tr>
<tr>
<td>097877</td>
<td>2, Sheets 1 - 2 of 2</td>
<td>CPP-659 NWCF Truck Bay Decon Spray Booth and Glovebox DSB-NC-601 and GBX NCD-920 Configuration</td>
</tr>
<tr>
<td>097878</td>
<td>2</td>
<td>ICPP BLDG 659 NWCF Truck Bay Liquid Abrasive Spray Glove Box GBX-NCD-920 Component Arrangement</td>
</tr>
<tr>
<td>184190</td>
<td>5, Sheet V-1</td>
<td>ICPP BLDG 659 Spray Booth DSB-NC-601 and HVAC Air Flow and Control Diagram</td>
</tr>
<tr>
<td>184193</td>
<td>2, Sheet V-4</td>
<td>ICPP BLDG 659 Decon Spray Booth DSB-NC-601 1st Level HVAC Plan View</td>
</tr>
<tr>
<td>384861</td>
<td>2</td>
<td>Debris Rule Compliance Project Steam Spray Booth Floor Plan, Sect. &amp; Details</td>
</tr>
<tr>
<td>384870</td>
<td>8</td>
<td>DSB-NC-601 &amp; GBX-NCD-920 Process Trench and Drain Flow Diagram</td>
</tr>
<tr>
<td>141706</td>
<td>6</td>
<td>FluorinEL and Storage Facility Architectural Enlarged Partial Plan EL -13'-0&quot; -27'-0&quot; -31-0&quot;</td>
</tr>
<tr>
<td>092723</td>
<td>1</td>
<td>CPP-659 Room # 415 Contamination Control Barrier Plan View</td>
</tr>
<tr>
<td>142404</td>
<td>4</td>
<td>FluorinEL and Storage Facility Mechanical Hatch Cover Waste Transfer Room</td>
</tr>
<tr>
<td>142423</td>
<td>3</td>
<td>FluorinEL and Storage Facility Mechanical Waste Transfer Shielded Box</td>
</tr>
<tr>
<td>143388</td>
<td>7</td>
<td>FluorinEL and Storage Facility Structural Dissolution Cell Wall Elevations and Sections Sht 1</td>
</tr>
<tr>
<td>143409</td>
<td>9</td>
<td>FluorinEL and Storage Facility Structural Dissolution Cell Sections Sht 2</td>
</tr>
<tr>
<td>143434</td>
<td>8</td>
<td>FluorinEL and Storage Facility Structural Dissolution Cell Sections Sht 3</td>
</tr>
<tr>
<td>143493</td>
<td>5</td>
<td>FluorinEL and Storage Facility Structural Typical Liner Plate Plan, Elevation, Section &amp; Details</td>
</tr>
<tr>
<td>Drawing Number</td>
<td>Revision Number</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>149885</td>
<td>2</td>
<td>FDP Cell Grating Modifications Steel Framing Plan @ EL -0'-2</td>
</tr>
<tr>
<td>149886</td>
<td>2</td>
<td>FDP Cell Grating Modifications Grating Plan @ EL -0'-0</td>
</tr>
<tr>
<td>141703</td>
<td>9</td>
<td>Fluorinel and Storage Facility Architectural Floor Plan EL 0'-0&quot;</td>
</tr>
<tr>
<td>092443</td>
<td>4</td>
<td>CPP-666 Space Occupancy First Floor Plan</td>
</tr>
<tr>
<td>350205</td>
<td>1</td>
<td>Slab Tank VES-FC-184Modify Cell Sump System</td>
</tr>
<tr>
<td>092700</td>
<td>7</td>
<td>CPP-666 Fluorinel Dissolution Process FM Area Noncontaminated Aqueous Waste Collection &amp; Disposal P&amp;ID</td>
</tr>
<tr>
<td>058061</td>
<td>20 Sheet 3</td>
<td>CPP-666 Fluorinel Dissolution Process Cell P &amp; ID</td>
</tr>
<tr>
<td>142524</td>
<td>2</td>
<td>Fluorinel and Storage Facility Mechanical Remote Handling Air Filtration Cell Plywood Box</td>
</tr>
<tr>
<td>630299</td>
<td>1 Sheets 1 – 3 of 3</td>
<td>CPP-659 Remote Waste Box Bail Assembly CONT-NCM-16</td>
</tr>
<tr>
<td>625880</td>
<td>3</td>
<td>RWMC Remote Handling for TRU Waste Interim Storage System Interim Storage Container Assembly and Details</td>
</tr>
<tr>
<td>625881</td>
<td>2</td>
<td>RWMC Remote Handling for TRU Waste Interim Storage System Interim Storage Container Sections and Details</td>
</tr>
<tr>
<td>625882</td>
<td>3</td>
<td>RWMC Remote Handling for TRU Waste Interim Storage System Interim Storage Container Lid Assembly and Details</td>
</tr>
<tr>
<td>625883</td>
<td>1</td>
<td>RWMC Remote Handling for TRU Waste Interim Storage System Interim Storage Container Insert Assembly and Details</td>
</tr>
<tr>
<td>513174</td>
<td>4</td>
<td>Storage and Characterization Overpack for RH-TRU Waste Final Assembly</td>
</tr>
<tr>
<td>511342</td>
<td>4 Sheet 1 of 3</td>
<td>30 Gallon Storage and Characterization Overpack for RH-TRU Waste</td>
</tr>
<tr>
<td>455184</td>
<td>3 Sheets 1 – 4 of 4</td>
<td>Storage and Characterization Overpack for RH-TRU Waste (Bolted Base Construction)</td>
</tr>
<tr>
<td>133413</td>
<td>25</td>
<td>CPP-659 Mechanical Flow Diagram Blend &amp; Hold Cell &amp; Valve Cubicle New Waste Calcining Facility</td>
</tr>
<tr>
<td>Drawing Number</td>
<td>Revision Number</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>635083</td>
<td>2</td>
<td>INTEC IWTU Modifications to NWCF Valve Cubicle P&amp;ID</td>
</tr>
<tr>
<td>571621</td>
<td>1</td>
<td>CPP-666 RH TRU Distillation System Instrumentation Legend</td>
</tr>
<tr>
<td>571622</td>
<td>3</td>
<td>CPP-666 RH-TRU Distillation System Instrumentation Legend</td>
</tr>
<tr>
<td>571700</td>
<td>2</td>
<td>CPP-666 RH-TRU Distillation Project Distillation Vessel Assembly VES-FC-101</td>
</tr>
<tr>
<td>571699</td>
<td>4</td>
<td>CPP-666 RH-TRU Distillation System Collection Vessel Assembly VES-FC-85</td>
</tr>
<tr>
<td>571693</td>
<td>2</td>
<td>CPP-666 RH-TRU Distillation System Spool Piece 1</td>
</tr>
<tr>
<td>571694</td>
<td>2</td>
<td>CPP-666 RH-TRU Distillation System Spool Piece 2</td>
</tr>
<tr>
<td>571695</td>
<td>2</td>
<td>CPP-666 RH-TRU Distillation System Spool Piece 3</td>
</tr>
<tr>
<td>571701</td>
<td>3</td>
<td>CPP-666 RH-TRU Distillation System Spool Piece 5</td>
</tr>
<tr>
<td>571697</td>
<td>2</td>
<td>INTEC-666 RH-TRU Distillation System Condenser Support Assembly</td>
</tr>
<tr>
<td>571718</td>
<td>2</td>
<td>INTEC CPP-666 RH-TRU Distillation System DNI Room Secondary Containment Pan Assembly</td>
</tr>
<tr>
<td>571518</td>
<td>1</td>
<td>INTEC CPP-666 RH-TRU Distillation System DNI Room Secondary Containment Threshold</td>
</tr>
<tr>
<td>571623</td>
<td>4</td>
<td>INTEC-666 RH-TRU Sodium Distillation System Installation Thermal Fluid Skid P&amp;ID</td>
</tr>
<tr>
<td>Drawing Number</td>
<td>Revision Number</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>571515</td>
<td>2 Sheets 1-5 of 5</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM DISTILLATION ASSEMBLY MODIFICATION</td>
</tr>
<tr>
<td>571517</td>
<td>1</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM SPOOL PIECE 4 MODIFICATION</td>
</tr>
<tr>
<td>571505</td>
<td>1 Sheet PF-1</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM CONDENSER/COLLECTION VESSEL PROCESS FLOW DIAGRAM</td>
</tr>
<tr>
<td>571501</td>
<td>3 Sheet P-1</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM CONDENSER/COLLECTION VESSEL DISTILLATION VESSEL AND CONDENSER PIPING AND INSTRUMENTATION DIAGRAM</td>
</tr>
<tr>
<td>571502</td>
<td>1 Sheet P-2</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM CONDENSER/COLLECTION VESSEL TRANSFER VESSEL AND COLLECTION VESSEL PIPING AND INSTRUMENTATION DIAGRAM</td>
</tr>
<tr>
<td>571503</td>
<td>3 Sheet P-3</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM CONDENSER/COLLECTION VESSEL FILTER AND VACUUM PUMP PIPING AND INSTRUMENTATION DIAGRAM</td>
</tr>
<tr>
<td>786868</td>
<td>1 Sheets 1-5 of 5</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM CONDENSER / COLLECTION VESSEL ASSEMBLY COND-FC-103A / VES-FC-85A</td>
</tr>
<tr>
<td>786869</td>
<td>1 Sheets 1-4 of 4</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM CONDENSER / COLLECTION VESSEL ASSEMBLY INNER ASSEMBLY COND-FC-103A/VES-FC-85A</td>
</tr>
<tr>
<td>786870</td>
<td>1 Sheets 1-3 of 3</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM CONDENSER / COLLECTION VESSEL OUTER SHELL ASSEMBLY</td>
</tr>
<tr>
<td>786871</td>
<td>0 Sheets 1-2 of 2</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM COLLECTION TANK ASSEMBLY VES-FC-85A</td>
</tr>
<tr>
<td>785276</td>
<td>1 Sheets 1-3 of 3</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM COLD TRAP FILTER ASSEMBLY F-FC-221</td>
</tr>
<tr>
<td>788579</td>
<td>2</td>
<td>CPP-666 RH-TRU SODIUM DISTILLATION SYSTEM SPOOL PIECE 6</td>
</tr>
<tr>
<td>Drawing Number</td>
<td>Revision Number</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------</td>
<td>--------------------------------------------------------------</td>
</tr>
<tr>
<td>790816</td>
<td>3</td>
<td>INTEC CPP-659/666 ARGON REPACKAGING STATION ARS 3 ARS 3 CONFIGURATIONS</td>
</tr>
<tr>
<td>792396</td>
<td>2</td>
<td>INTEC CPP-659/666 ARGON REPACKAGING STATION 2.0 SHEQ-FC-920</td>
</tr>
<tr>
<td>801880</td>
<td>0</td>
<td>INTEC CPP-659/666 ARGON REPACKAGING STATION LARGE BOX ASSEMBLY SHEQ-NCD-940</td>
</tr>
</tbody>
</table>
OPERATING LCCG

1.0 GENERAL

1.1 THIS DRAWING ADDRESSES THE SUPPLY AND EXHAUST VENTILATION SYSTEMS FOR THE STEAM SPRAY BOOTH AND THE LIQUID ABRASIVE SPRAYING CLOGENS.

1.2 THE STEAM SPRAY BOOTH OPERATES IN EITHER A VENTILATION OR EXHAUST OFF MODE.

1.3 WHEN THE STEAM SPRAY BOOTH VENTILATION SUPPLY FAN IS NOT OPERATING THE EXHAUST SYSTEM CONTINUES TO MAINTAIN THE INDICATED VENTILATION PRESSURE BY INDUCING THE AIRFLOW AS SCHEDULED AS VENTILATION OFF MODE THROUGH EXISTING BACKDOOR DAMPERS.

1.4 SEE THE "SCHEDULE OF OPERATING SCHEMES" FOR THE POSSIBLE OPERATING SCHEMES, THEIR AIRFLOW SETPOINTS, AND THE DAMPER CONDITIONS (OPEN, CLOSED, MODULATION).  

2.0 SEQUENCE OF OPERATIONS

2.1 THE OPERATOR SELECTS THE OPERATING SCHEME (ON OR OFF).

2.2 FOR THE SELECTED OPERATING SCHEME, THE SOFTWARE DOES THE FOLLOWING:

2.2.1 SETS THE SCHEDULED DAMPER CONDITIONS.

2.2.2 STARTS THE DAMPER MODULATION.

2.2.3 STARTS THE SUPPLY FAN.

2.3 FLOW CONTROL MODULATES THE MODIFIED DAMPER AND MAINTAINS THE EXHAUST AIRFLOW AT SETPOINT.

2.4 THE SPACE PRESSURE CONTROLLER, NS-601, MODULATES THE INLET VAVES OF THE SUPPLY FAN TO MAINTAIN SETPOINT.

2.5 AT THE END OF OPERATIONS, THE OPERATOR SELECTS THE OFF SCHEME TO MAINTAIN MINIMUM FLOW AND SPACE PRESSURE DURING NON-OPERATING CONDITIONS.

3.0 OTHER OPERATIONS

3.1 AIR FROM THE EQUIPMENT DECOR ROOM IS DRAINED THROUGH THE EXHAUST CLOGEN AND INTO THE SPACE THROUGH EXISTING FILTERS AS INDICATED.

3.2 NO SMOKE DETECTION OR AUTOMATIC SHUT-DOWN OF THE SUPPLY FAN IS PROVIDED FOR FIRE IN THE EVENT OF FIRE IN THE TRUCK BAY OR THE SPRAY BOOTH. THE CONDITION IS ALARMED AND THE OPERATOR MUST MANUALLY STOP THE FAN.

3.3 CO2 AND O2 DETECTIONS ACTIVATE ALARM IN-601 UPON DEVIATION FROM XEROPHERS OBTAINED BY THE CONTRACTOR.

4.0 NOTES

4.1 SCHEDULED SUPPLY FAN AIRFLOW FOR CO2 INLETS ARE MAXIMUM AIRFLOW, BASED UPON CONTINUOUS CO2 BLASTS OF 850 CFM.

4.2 FOR LEGEND SEE DNG 184778.

4.3 FOR EQUIPMENT SCHEME SEE DNG 184191.

REFERENCE DRAWINGS

130190 PROCESS & INSTRUMENTATION DIAGRAM, EQUIPMENT DECOR ROOM
PLAN VIEW FIRST FLOOR
-1 ASSEMBLY

VIEW E
VIEW F
VIEW G
VIEW H
VIEW D

FOR GENERAL NOTES AND LIST OF MATERIAL SEE DRAWING 092725

DARK LINES INDICATE INSTALLATION

REFERENCE DRAWINGS:
092722 THRU 092725
099-659

PIPING DIMENSIONAL TOLERANCES

<table>
<thead>
<tr>
<th>Dimensional Tolerance</th>
<th>1/16&quot;</th>
<th>1/8&quot;</th>
<th>3/16&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>+/- 0.005</td>
<td>+/- 0.01</td>
<td>+/- 0.02</td>
</tr>
</tbody>
</table>

SCHEDULE

Scale: 5/8" = 1'0"
PLAN TO GRATING EL. 0'-0" REVISIONS GRATING PLAN

SUB CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE THE FABRICATION OF GRATING PANELS AND SUPPORT BEAMS.
NOTES:
1. PRINT LETTERING AND NUMBERING IN 2" HIGH CHARACTERS USING BLACK ENAMEL PAINT AS SPECIFIED IN SPC-511.
2. CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI, USE OF AN INTEGRAL WATER REPELLENT ADAGENT (SUCH AS GRACE CONSTRUCTION PRODUCTS' DATAPEL).
3. REINFORCING STEEL SHALL COMPLY TO ASTM A615 GRADE 60.
4. WATER PROOFSING ON ALL EXPOSED SURFACES PER SPC-511.
5. SEE SPC-511 FOR DIMENSIONAL TOLERANCES.
6. MATERIAL SPECIFICATIONS AND TESTING FOR FINIAL ASSEMBLY TO BE PER SPC-511.
7. WEIGHT LUG AND HANGER DETAIL ON LUG IS 50 LBS.
1. Torque in accordance with bolt torque sequence to required value. Internal torque value for top flange bolts to allow lifting or transport of assembly. Empty overpack shall be 150 ± 25 ft lbs. Torque value for top and bottom flange bolts shall be 350 ± 50 ft lbs.

2. All 1/4-20 UNF threading (including overpacks) shall have complete threads of the form M1.5-0.272.4, assembly number 10-151.9-8.3 mm, with a tolerance of ± 0.2 mm.

3. Torque tool 1/4-20 UNF threading (including overpacks) shall be removed using 3/4 inch diameter wrench on the outside face of the top and bottom flanges.

4. All overpacks shall be 3.14 high and produced individually or in groups by impact force applied by hammer or other device to drive stamp into the material. "K" indicates overpack assembly number.

5. Mark "EMPTY WEIGHT XXXX LBS" on two sides of the overpack with 3/4 inch high characters using black enamel paint, where XXXX represents the actual overpack weight, scale accuracy to be ± 2 lbs.

6. Overpacks assembled after 6-1-2000 shall have at least one item 10 overpack assembled prior to that date that requires sampling shall be a 1/2 of a 200-2000 assembly using 3/4 inch diameter wrench on the outside face of the top and bottom flanges.

-1 THRU -10 ASSEMBLIES
NOTES:
1. MAXIMUM SURFACE ROUGHNESS TO BE 320 UNLESS OTHERWISE NOTED.
2. REMOVE ALL BURRS, SCALE, OIL, AND FILL ZEUS OIL IN Shell
   AND FLANGE TO 1/16 x 1/32 RADIUS OR CHAMFER.
3. MATERIAL, SUBSTITUTIONS ALLOWED WITH WRITTEN APPROVAL FROM
   DESIG. ENGINEERING AND ENVIRONMENTAL LABORATORY.
4. REMOVED
5. REMOVED
6. REMOVED
7. REMOVED
8. REMOVED
9. REMOVED
10. REMOVED
11. REMOVED
12. REMOVED

IT IS POSSIBLE TO FABRICATE THE FLANGES FROM A CARBON STEEL
   BLIND PIPE FLANGE, 25-INCH, CLASS 600 LB, ASTM A105. HOWEVER,
   THE INSTALLATION RETURN SHAL BE THAT OF THE ORIG.

14. FILL ZEUS IN THE TEST PRESSURE OF 10 TO 20 PSI. HOLD THE
    TEST PRESSURE FOR A MINIMUM OF 15 MINUTES PRIOR TO THE
    TEST. THE OVERPACK BUILT PARTS THE TEST.

15. USE A LEAK TEST SOLUTION OF AN INVESTIGATOR
    QUALIFIED PER API 579-1/2013 LEVEL II OR III.

17. ALL SURFACES EXCEPT O-RING GROOVE SURFACES, THEIR WAVING SURFACES, AND
    THREADED HOLES ARE TO BE HAND PLATED CLEAN PARTS. SURFACES
    WHICH ARE TO BE ROTTED CLEAN ARE TO BE SPRAYED "Z.EUS" OR "Z.
    OIL" OR COMPARES. THREAD FLUSHING HOLES ARE TO BE PAINTED WITH TWO COATS OF
    ITEM 19 PER MANUFACTURER'S INSTRUCTIONS EXCEPT AS NOTED.

18. REMOVED
19. REMOVED
20. REMOVED
21. REMOVED
22. MARK "SMALL WEIGHT XXXX LBS" ON THE SIDE OF THE OVERPACK, WITH
    SEE HEAD IN THE END OF THE BOLT OR BOLT FOR MANUFACTURER'S
    RECOMMENDATIONS.

24. APPLY ITEM 22 TO ITEMS 15 AND 16 AND ALL UNPAINTED SURFACES PER
    MANUFACTURER'S RECOMMENDATIONS.
### INSTRUMENTATION IDENTIFICATION SYMBOLS

<table>
<thead>
<tr>
<th>LETTER</th>
<th>MODIFIER</th>
<th>OUTPUT FUNCTION</th>
<th>MODIFIER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ANALYZE</td>
<td>ALARM FUNCTION</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>JOMER, CONSUMPTION</td>
<td>USER'S CHOICE</td>
<td>USER'S CHOICE</td>
</tr>
<tr>
<td>C</td>
<td>CONDUCTIVITY</td>
<td>CONTROL</td>
<td>CLOSE</td>
</tr>
<tr>
<td>D</td>
<td>DISCHARGE, SPD</td>
<td>DIFFERENTIAL</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>EDESE</td>
<td>SENSOR (PRIMARY ELEMENT)</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>FLOW RATE</td>
<td>RATE (FRACTION)</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>USER'S CHOICE</td>
<td>CLASS, VIEWING</td>
<td>BIVALENT</td>
</tr>
<tr>
<td>H</td>
<td>HIGH</td>
<td>HIGH</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>CURRENT (ELECTRICAL)</td>
<td>INDICATE</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>OSCILLOSCOPIC</td>
<td>SCAN</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>TIME SCHEDULE</td>
<td>TIME OF CHARGE</td>
<td>HIGH</td>
</tr>
<tr>
<td>L</td>
<td>LEVEL</td>
<td>LOW</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>WATER</td>
<td>LIQUID</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>USER'S CHOICE</td>
<td>USER'S CHOICE</td>
<td>USER'S CHOICE</td>
</tr>
<tr>
<td>O</td>
<td>USER'S CHOICE</td>
<td>SIGNAL, DESTINATION</td>
<td>OPEN</td>
</tr>
<tr>
<td>P</td>
<td>POINT (TEMP)</td>
<td>POINT TEST</td>
<td>CONNECTION</td>
</tr>
<tr>
<td>Q</td>
<td>QUANTITY</td>
<td>INTEGRATE</td>
<td>TOTAL</td>
</tr>
<tr>
<td>R</td>
<td>NAVIGATION</td>
<td>RECORD</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>SPEED, FREQUENCY</td>
<td>SAFETY</td>
<td>SMITH</td>
</tr>
<tr>
<td>T</td>
<td>TEMPERATURE</td>
<td>TRANSPORT</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>MULTIFUNCTION</td>
<td>MULTIFUNCTION</td>
<td>MULTIFUNCTION</td>
</tr>
<tr>
<td>V</td>
<td>VIBRATION</td>
<td>VIBRATION</td>
<td>VALUE, TIPPER, LOWER</td>
</tr>
<tr>
<td>W</td>
<td>WEATHER, FORCE</td>
<td>HELM</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>VIBRATION</td>
<td>X AXIS</td>
<td>UNCLASSIFIED</td>
</tr>
<tr>
<td>Y</td>
<td>EVENT TIME, FREQUENCY</td>
<td>Y AXIS</td>
<td>RELAY, COMPUTE, CONVERT</td>
</tr>
<tr>
<td>Z</td>
<td>POSITION, DIMENSION</td>
<td>Z AXIS</td>
<td>DRIVER, ACTUATOR, UNCLASSIFIED</td>
</tr>
</tbody>
</table>

### PILOT LIGHT DESIGNATIONS

<table>
<thead>
<tr>
<th>LETTER</th>
<th>RED</th>
<th>YELLOW</th>
<th>GREEN</th>
<th>LIGHT BLUE</th>
<th>DARK BLUE</th>
<th>MAGENTA</th>
<th>WHITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>RED</td>
<td>UNSAFE</td>
<td>SAFETY</td>
<td>SAFE</td>
<td>EQUIPMENT IN SERVICE</td>
<td>EQUIPMENT IN STANDBY</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>YELLOW</td>
<td>CAUTION</td>
<td>HAZARD</td>
<td>DANGER</td>
<td>MAJOR LEBELS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>GREEN</td>
<td>SAFE</td>
<td>SAFE</td>
<td>SAFE</td>
<td>SAFE</td>
<td>SAFE</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>LIGHT BLUE</td>
<td>LIGHT BLUE</td>
<td>LIGHT BLUE</td>
<td>LIGHT BLUE</td>
<td>LIGHT BLUE</td>
<td>LIGHT BLUE</td>
<td>LIGHT BLUE</td>
</tr>
<tr>
<td>D</td>
<td>DARK BLUE</td>
<td>DARK BLUE</td>
<td>DARK BLUE</td>
<td>DARK BLUE</td>
<td>DARK BLUE</td>
<td>DARK BLUE</td>
<td>DARK BLUE</td>
</tr>
<tr>
<td>M</td>
<td>MAGENTA</td>
<td>MAGENTA</td>
<td>MAGENTA</td>
<td>MAGENTA</td>
<td>MAGENTA</td>
<td>MAGENTA</td>
<td>MAGENTA</td>
</tr>
<tr>
<td>W</td>
<td>WHITE</td>
<td>DYNAMIC DATA</td>
<td>DYNAMIC DATA</td>
<td>DYNAMIC DATA</td>
<td>DYNAMIC DATA</td>
<td>DYNAMIC DATA</td>
<td>DYNAMIC DATA</td>
</tr>
</tbody>
</table>

* - THE ASSOCIATED COLOR MEANINGS ARE FOR ELECTRICAL POWER DISTRIBUTION SYSTEM DISPLAYS ONLY.
NOTES:

1. REMOVE ALL BURRS AND SHARP EDGES.
2. ALL MACHINED FİLETS MUST BE 0.3 MAXIMUM UNLESS OTHERWISE NOTED.
3. USE THREAD LUBRICANT (REF 12) ON ALL BOLT THREADS.
4. FINAL ASSEMBLY SHALL BE PIECE OF ORTS, CORPS, WEARING FLUX, SLUG, SCALE, OIL, GREASE ETC. PERFORM A VISUAL INSPECTION OF THE FINAL ASSEMBLY PER ASME AX50, PARA. 1.2.1.
5. DRILL BOLTS ON 4.0 D.O. OF FLANGES TO 15 (42/0) FT LB USING A STAR PATTERN.
6. COMPLETELY ASSEMBLY SHALL UNDERGO A HYDRAULIC LEAK TEST IN ACCORDANCE WITH ASME B31.3 AT A MAXIMUM PRESSURE OF 165 PSI. "GOOCH" ALL CONNECTIONS FOR LEAKS. PRESSURE DROP SHALL NOT EXCEED 3.5 PSI OVER A 10 MINUTE PERIOD.
7. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH ASME B31.3 USING REF 11.
8. VISUALLY INSPECT ALL WELDS IN ACCORDANCE WITH ASME B31.3 PARA. 34.6.4 (4) FOR NORMAL FLUX SERVICE. ACCEPTANCE CRITERIA SHALL BE PER ASME B31.3, PARA. 34.1.3.2.
9. PERFORM IMPLANTATION INSPECTION OF WELDS WHERE SPECIFIED PER ASME B31.3 PARA. 34.4.7 USING LIQUID PENETRANT EXAMINATION OF THE ROOT AND FINAL PASS.
10. LIQUID PENETRANT EXAMINATION SHALL BE PERFORMED IN ACCORDANCE WITH THE Kirk's 3M SPECIFICATION FOR X-RAY & ACCEPTANCE CRITERIA SHALL BE PER:
   A. ALL SURFACES SHALF BE FREE OF:
      1. RELIEVING LINER INDEGMENTS
      2. RELIEF BURIED INDEGMENTS GREATER THAN 1.6 MM (0.06"
   B. DETECTED BY RELIEVING LINER INDEGMENTS IN A LINE
   C. RELIEF Liner INDEGMENTS DETECTED, Irrespective of Surface Conditions, Are UNACCEPTABLE.

11. TOLERANCES ON DIMENSIONS:
   A. ± 0.0125
   B. DESIGN TEMPERATURE = 200°F
   C. DESIGN PRESSURE = FULL VACUUM TO 15 PSI.
NOTES:
1. REMOVE ALL BURRS AND SHARP EDGES.
2. ALL MACHINED FILLET RADIUS .03 MAXIMUM UNLESS OTHERWISE NOTED.
3. USE THREAD LUBRICANT (SW3) ON ALL BOLT THREADS.
4. FINAL ASSEMBLY SHALL BE FREE OF OIL, OILS, WELDING FLUX, SLAG, SCALE, OIL, OIL, OIL, ETC. PERFORM A VISUAL INSPECTION OF THE FINAL ASSEMBLY FOR
   ANY OIL, OIL, OIL, OIL.
5. TIE-RODS TO BE 4.5" 0.062" OF FLANGES TO 15 (42/40) FT LEAD USING A STAR
   PATTERN.
6. COMPLETE ASSEMBLY UNDER A PNEUMATIC LEAK TEST IN ACCORDANCE
   WITH ASME B31.3 AT A PRESSURE OF 165 TO 185 PSI. DO NOT ALL
   CONNECTIONS FOR LEAKS. PRESSURE DROP SHALL NOT EXCEED 0.1 PSI OVER A
   10 MINUTE PERIOD.
7. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH ASME B31.3 USING FERF 12.
8. VISUALLY INSPECT ALL WELDS IN ACCORDANCE WITH ASME B31.3 PARA. 344.41
   (A) FOR NORMAL FILL SERVICE, ACCEPTANCE CRITERIA SHALL BE PER ASME
   B31.3, PARA. 341.3.2
9. PERFORM PRESSURIZED INSPECTION OF WELDS WHERE SPECIFIED PER ASME B31.3,
   PARA. 344.4.7 USING LOW PRESSURE EXAMINATION OF THE ROOT AND FINAL PASS.
10. LOW PRESSURE EXAMINATION SHALL BE PERFORMED IN ACCORDANCE WITH THE
    ASME CODE SECTION V HEREIN ACCEPTANCE CRITERIA SHALL BE PER
    (1) ALL SURFACES TO BE CLEANED SHALL BE FREE OF (1) RELEVANT LEAKAGE INDICATIONS
       (2) VERY SMALL LEAKAGE INDICATIONS GREATE THAN 8 MM (1/50")
       (3) FOUR OR MORE RELEVANT LEAKAGE INDICATIONS IN A LINE
    (2) SEPARATE BE 15 WILKINS ON LEAKAGE INDICATIONS, PREVIOUS TO CLEANING.

TOLERANCES ON DEMANDS
   300 = .05

12. PIPE DESIGN TEMPERATURE = 1000° F
13. DESIGN PRESSURE = FULL VACUUM TO 15 PSI.

SEE DRAWING 571692 (-1 ASSEMBLY) FOR EQUIPMENT REFERENCE
3D VIEW
(SHOWN FOR CLARITY)
SCALE 1:100

SEE DRAWING 571692 (-1 ASSEMBLY) FOR EQUIPMENT REFERENCE

Randy Eastman
CWI
2014.03.20 08:02:20 -06'00'

Jim Moncur
CWI
2014.03.19 13:33:34 -06'00'

David Morgan
CWI
2014.03.20 08:37:30 -06'00'

Kris Keller
CWI
2014.03.20 09:51:22

Idaho Cleanup Project
CPP-666
RH-THE DISTILLATION SYSTEM
SPOOL PIECE 2

571694

1/2 OF 2
3D VIEW

(Sketch for clarity)

SCALE: NONE

NOTES:

1. REMOVE ALL BURRS AND SHARP EDGES.
2. ALL MACHINED FEET RADIUS MAXIMUM UNLESS OTHERWISE NOTED.
3. FINAL ASSEMBLY SHALL MEET CLEANLINESS REQUIREMENTS OF STC-7023.
4. REMOVED.
5. COMPLETE ASSEMBLY SHALL UNDERGO A PRESSURE TEST IN ACCORDANCE WITH TFR-9980. PRESSURE TEST PROCEDURE APPLIES TO ALL RESISTANCE PRESSURE TEST METHOD: USE AIR OR HEAT IN A PRESSURE OF 5 PSIG, 45-60 PSIG.
6. TESTING SHALL BE PERFORMED IN ACCORDANCE WITH ALL HEAT TREATMENTS PERFORMED ON HEAT TREATED COMPONENTS. TESTING SHALL BE PERFORMED IN ACCORDANCE WITH API 601. TESTING SHALL BE PERFORMED IN ACCORDANCE WITH API 601.
7. SEE DRAWING 275602 FOR ASSEMBLY 1. ASSEMBLY 2.
8. PERFORM IN-PROCESS EXAMINATION PER TFR-9981 AND ASME B31.3, PARAGRAPH 244.77.
9. LIGE NITROGEN EXAMINATION SHALL BE PERFORMED ON ALL HEAT TREATMENTS IN ACCORDANCE WITH TFR-9980.
VIEW B-B
SCALE 1/4

CONNECTION TO VES-PD-05
SEE DRAWING 571692 (1/05/04/04)
FOR EQUIPMENT REFERENCE
NOTES:

1. REMOVE ALL BURRS AND SHARP EDGES.

2. ALL MACHINED FITTEN RACKS MAXIMUM UNLESS OTHERWISE NOTED.

3. FINAL ASSEMBLY SHALL BE FREE OF DIRT, OIL, CHEMICALS, WELDING FLUX, SCALE, OIL, GREASE, ETC. PERFORM A VISUAL INSPECTION OF THE FINAL ASSEMBLY PER ASME "ASME, P-7.2.1.

4. COMPLETED ASSEMBLY SHALL UNDERGO A PRESSURE LEAK TEST IN ACCORDANCE WITH ASME B31.3 AT A PRESSURE OF 1.6X TO 1.8X MAX. "LOOK" ALL CONNECTIONS FOR LEAKS. PRESSURE DROP SHALL NOT EXCEED 0.1 PSIG OVER A 10 MINUTE PERIOD.

5. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH ASME B31.3 USING FILLER 4.

6. VISUALLY INSPECT ALL WELDS IN ACCORDANCE WITH ASME B31.3, PARA. 34.4.1 (A) FOR NORMAL FLUID SERVICE. ACCEPTANCE CRITERIA SHALL BE PER ASME B31.3, PARA. 34.4.7 USING LIQUID PENETRANT EXAMINATION OF THE ROOT AND FINAL PASS.

7. LIQUID PENETRANT EXAMINATION SHALL BE PERFORMED IN ACCORDANCE WITH THE API CODE SECTION 5, ARTICLE 5. ACCEPTANCE CRITERIA SHALL BE:

   A. ALL SURFACES TO BE EXAMINED SHALL BE OIL FREE.

   B. RADIANT LEAKAGE RADIATIONS GREATER THAN 5 MV (32/16)

   C. SOURCES NEAR RADIANT LEAKAGE RADIATIONS IN A LINE.

8. SEPARATED BY 1.0 MV (1/16) OR LESS, END-TO-END.

   TOLERANCES ON DIMENSIONS:

   X = 4.000

   Y = 2.000

9. DESIGN TEMPERATURE = 200°F

10. DESIGN PRESSURE = FULL VACUUM TO 15 PSI.

11. REMOVED

12. REMOVED

13. REMOVED

SEE DRAWING 571692 (2-1 ASSEMBLY) FOR EQUIPMENT REFERENCE.
NOTES:

1. REMOVE ALL BURRS AND SNAPPY EDGES.

2. PANEL MATERIAL SHALL MEET CLEANLINESS REQUIREMENT OF SAE-7609, LEVEL 6.
NOTES:
1. REMOVE ALL BURRS AND SHARP EDGES.
2. ALL MACHINED PARTS ARE AS MAXIMUM UNLESS OTHERWISE NOTED.
3. DRAWING IS GENERATED FROM DRAWING 571699.

3D VIEW
(SHOWN FOR CLARITY)
SCALE NONE

DISTILLATION VESSEL

EXISTING 2" LINE
FROM DISTILLATION VESSEL

REMOVE EXISTING PIPE

CUT EXISTING PIPE AT EIGHT FEET LINE
A CONSTRUCTION CONDITION AS OF 7-15-15

### Electrical

**Electrical**

- **Switch**
- **Panel**
- **Wiring**

**Machanical**

- **Pump**
- **Valve**
- **Pipe**

**Nominal**

- **Dimensions**
- **Material**

### Notes

- **Notes Contained**
- **Drawing Notes**

### Project Information

**Idaho Cleanup Project**

- **CPP-666**
- **RH-TRU DISTILLATION SYSTEM**
- **CONDENSER / COLLECTION VESSEL ASSEMBLY**

**COND-FC-103A / VES-FC-85A**

**Index Code Number**

- **0666 53 136**

**Parts List**

1. **CONDENSER / COLLECTION OUTER SHELL**
2. **CONDENSER / COLLECTION OUTER SHELL**
3. **CONDENSER / COLLECTION OUTER SHELL**
4. **CONDENSER / COLLECTION OUTER SHELL**
5. **CONDENSER / COLLECTION OUTER SHELL**
6. **CONDENSER / COLLECTION OUTER SHELL**
7. **CONDENSER / COLLECTION OUTER SHELL**

**Technical Check**

- **T. BURNETT P.E.**
- **R. EASTMAN P.E.**
- **D. MORGAN**
- **W. REED**
- **R. CAMPBELL**

**Sign and Date**

- **9622**
- **2015.08.05 15:17:19 -06'00'**

**Scale**

- **20031720**

**Notes:**

1. **REMOV ALL BURRS AND SHARP EDGES.**
2. **ALL MADEH FILTER size required unless otherwise noted.**
3. **Final assembly shall be free of dirt, chips, seams, flux, tack, oil, grease, etc. Perform a visual inspection on the final assembly.**
4. **Weigh shall be performed in accordance with AWS B/C2.0 Code.**
5. **Welding shall be performed in accordance with AWS B/C2.0 Code.**
6. **ASTM C1217-00 OR RDT F7-3T. DO NOT APPLY VARNISH OVER MARKING.**
7. **WITH SANFORD T.E.C. MARKER #13401 OR #13501, ITW DYMON FORMULA Q404 TO THE NEAREST POUND. LOCATE APPROXIMATELY WHERE SHOWN. FILL CHARACTERS**
8. **LEAK TEST SHALL BE PERFORMED BEFORE LEAD SHOT IS INSTALLED SO THREADED**
9. **COMPLETED THERMAL FLUID SIDE OF THE CONDENSER SHALL UNDERGO A PNEUMATIC**
10. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
11. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
12. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
13. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
14. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
15. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
16. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
17. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
18. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
19. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
20. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
21. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
22. **PRESSURE DROP SHALL NOT EXCEED 1.0 PSIG OVER A 10 MINUTE PERIOD FOR ON-SITE FABRICATION.**
-0 ASSEMBLY

SCALE: 1/4
NOTES:

1. REMOVE ALL BURRS AND SHARP EDGES.

2. ALL MACHINED FEAT H/D 0.005 MAXIMUM UNLESS OTHERWISE NOTED.

3. FINAL ASSEMBLY SHALL DESIGNS DEPT. TO MEANINGFUL SCALE. SCALE OR DEPART FROM FABRICATION. REDUCE FOR OFF-SITE FABRICATION OR PIPE ASSEMBLY USING TECHNIQUES REQUIREMENTS OF STD-702, LEVEL 6 FOR ON-SITE FABRICATION.

4. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH AWS D1.1. DESIGNATION II USING 95% OF BASE METAL. THIS USES A WELDING PROCEDURE SPECIFICATION 95% WELDING METAL FOR ON-SITE FABRICATION.

5. VISUALLY INSPECT TANK FEAT OF ALL BASE. ACCEPTANCE CRITERIA SHALL BE:

   a. NO CRACKS.
   b. COMPLETE UGENT IDEAL BETWEEN WELD METAL AND BASE METAL. UNLESS MERICAN招标文件规范，否则不满足焊缝耐受性。
   c. WELD METAL NOT EXCEED 0.125" FOR MATERIAL, 0.125" FOR MATERIALS 0.125" AND MATERIALS NOT TO EXCEED 0.125".
   d. FOR ALL WELDS, THE SUN OF WELDING SEAM WAS 0.5" OR GREATER IN LENGTH SHALL NOT EXCEED 0.125" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 0.125" IN ANY INCH OF WELD.
   e. ALL CRACKS SHALL BE FILLED TO THE FULL CROSS-SECTION OF THE WELD EXCEPT END OF WELD. THERE EFFECTIVE LENGTH.

   f. WELDING MUS BE AT LEAST 0.05" AS SPECIFIED IN THE WELD SYMBOL.

   g. WELDING MUS BE PER PERMITTED OR A WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 9 FOR ON-SITE FABRICATION.

   h. VISUALLY INSPECT FINAL PASS OF ALL WELDS. ACCEPTANCE CRITERIA SHALL BE:

      1. NO CRACKS.
      2. COMPLETE FUSION SHALL EXIST BETWEEN WELD METAL AND BASE METAL UNDERCUT SHALL NOT EXCEED 0.01" FOR MATERIAL, 0.01" FOR MATERIALS 0.01" AND MATERIALS NOT TO EXCEED 0.01".
      3. FOR ALL WELDS, THE SUM OF WELDING SEAM WAS 0.5" OR GREATER IN LENGTH SHALL NOT EXCEED 0.01" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 0.01" IN ANY INCH OF WELD.
      4. ALL CRACKS SHALL BE FILLED TO THE FULL CROSS-SECTION OF THE WELD EXCEPT END OF WELD. THERE EFFECTIVE LENGTH.

   i. WELDING MUS BE PER OR A WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 9 FOR ON-SITE FABRICATION.

   j. VISUALLY INSPECT FINAL PASS OF ALL WELDS. ACCEPTANCE CRITERIA SHALL BE:

      1. NO CRACKS.
      2. COMPLETE FUSION SHALL EXIST BETWEEN WELD METAL AND BASE METAL UNDERCUT SHALL NOT EXCEED 0.01" FOR MATERIAL, 0.01" FOR MATERIALS 0.01" AND MATERIALS NOT TO EXCEED 0.01".
      3. FOR ALL WELDS, THE SUM OF WELDING SEAM WAS 0.5" OR GREATER IN LENGTH SHALL NOT EXCEED 0.01" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 0.01" IN ANY INCH OF WELD.
      4. ALL CRACKS SHALL BE FILLED TO THE FULL CROSS-SECTION OF THE WELD EXCEPT END OF WELD. THERE EFFECTIVE LENGTH.

   k. WELDING MUS BE PER OR A WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 9 FOR ON-SITE FABRICATION.

   l. VISUALLY INSPECT FINAL PASS OF ALL WELDS. ACCEPTANCE CRITERIA SHALL BE:

      1. NO CRACKS.
      2. COMPLETE FUSION SHALL EXIST BETWEEN WELD METAL AND BASE METAL UNDERCUT SHALL NOT EXCEED 0.01" FOR MATERIAL, 0.01" FOR MATERIALS 0.01" AND MATERIALS NOT TO EXCEED 0.01".
      3. FOR ALL WELDS, THE SUM OF WELDING SEAM WAS 0.5" OR GREATER IN LENGTH SHALL NOT EXCEED 0.01" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 0.01" IN ANY INCH OF WELD.
      4. ALL CRACKS SHALL BE FILLED TO THE FULL CROSS-SECTION OF THE WELD EXCEPT END OF WELD. THERE EFFECTIVE LENGTH.

   m. WELDING MUS BE PER OR A WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 9 FOR ON-SITE FABRICATION.

   n. VISUALLY INSPECT FINAL PASS OF ALL WELDS. ACCEPTANCE CRITERIA SHALL BE:

      1. NO CRACKS.
      2. COMPLETE FUSION SHALL EXIST BETWEEN WELD METAL AND BASE METAL UNDERCUT SHALL NOT EXCEED 0.01" FOR MATERIAL, 0.01" FOR MATERIALS 0.01" AND MATERIALS NOT TO EXCEED 0.01".
      3. FOR ALL WELDS, THE SUM OF WELDING SEAM WAS 0.5" OR GREATER IN LENGTH SHALL NOT EXCEED 0.01" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 0.01" IN ANY INCH OF WELD.
      4. ALL CRACKS SHALL BE FILLED TO THE FULL CROSS-SECTION OF THE WELD EXCEPT END OF WELD. THERE EFFECTIVE LENGTH.

   o. WELDING MUS BE PER OR A WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 9 FOR ON-SITE FABRICATION.

   p. VISUALLY INSPECT FINAL PASS OF ALL WELDS. ACCEPTANCE CRITERIA SHALL BE:

      1. NO CRACKS.
      2. COMPLETE FUSION SHALL EXIST BETWEEN WELD METAL AND BASE METAL UNDERCUT SHALL NOT EXCEED 0.01" FOR MATERIAL, 0.01" FOR MATERIALS 0.01" AND MATERIALS NOT TO EXCEED 0.01".
      3. FOR ALL WELDS, THE SUM OF WELDING SEAM WAS 0.5" OR GREATER IN LENGTH SHALL NOT EXCEED 0.01" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 0.01" IN ANY INCH OF WELD.
      4. ALL CRACKS SHALL BE FILLED TO THE FULL CROSS-SECTION OF THE WELD EXCEPT END OF WELD. THERE EFFECTIVE LENGTH.

   q. WELDING MUS BE PER OR A WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 9 FOR ON-SITE FABRICATION.

   r. VISUALLY INSPECT FINAL PASS OF ALL WELDS. ACCEPTANCE CRITERIA SHALL BE:

      1. NO CRACKS.
      2. COMPLETE FUSION SHALL EXIST BETWEEN WELD METAL AND BASE METAL UNDERCUT SHALL NOT EXCEED 0.01" FOR MATERIAL, 0.01" FOR MATERIALS 0.01" AND MATERIALS NOT TO EXCEED 0.01".
      3. FOR ALL WELDS, THE SUM OF WELDING SEAM WAS 0.5" OR GREATER IN LENGTH SHALL NOT EXCEED 0.01" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 0.01" IN ANY INCH OF WELD.
      4. ALL CRACKS SHALL BE FILLED TO THE FULL CROSS-SECTION OF THE WELD EXCEPT END OF WELD. THERE EFFECTIVE LENGTH.

   s. WELDING MUS BE PER OR A WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 9 FOR ON-SITE FABRICATION.

   t. VISUALLY INSPECT FINAL PASS OF ALL WELDS. ACCEPTANCE CRITERIA SHALL BE:

      1. NO CRACKS.
      2. COMPLETE FUSION SHALL EXIST BETWEEN WELD METAL AND BASE METAL UNDERCUT SHALL NOT EXCEED 0.01" FOR MATERIAL, 0.01" FOR MATERIALS 0.01" AND MATERIALS NOT TO EXCEED 0.01".
      3. FOR ALL WELDS, THE SUM OF WELDING SEAM WAS 0.5" OR GREATER IN LENGTH SHALL NOT EXCEED 0.01" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 0.01" IN ANY INCH OF WELD.
      4. ALL CRACKS SHALL BE FILLED TO THE FULL CROSS-SECTION OF THE WELD EXCEPT END OF WELD. THERE EFFECTIVE LENGTH.

   u. WELDING MUS BE PER OR A WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 9 FOR ON-SITE FABRICATION.

   v. VISUALLY INSPECT FINAL PASS OF ALL WELDS. ACCEPTANCE CRITERIA SHALL BE:

      1. NO CRACKS.
      2. COMPLETE FUSION SHALL EXIST BETWEEN WELD METAL AND BASE METAL UNDERCUT SHALL NOT EXCEED 0.01" FOR MATERIAL, 0.01" FOR MATERIALS 0.01" AND MATERIALS NOT TO EXCEED 0.01".
      3. FOR ALL WELDS, THE SUM OF WELDING SEAM WAS 0.5" OR GREATER IN LENGTH SHALL NOT EXCEED 0.01" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 0.01" IN ANY INCH OF WELD.
      4. ALL CRACKS SHALL BE FILLED TO THE FULL CROSS-SECTION OF THE WELD EXCEPT END OF WELD. THERE EFFECTIVE LENGTH.

   w. WELDING MUS BE PER OR A WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 9 FOR ON-SITE FABRICATION.

   x. VISUALLY INSPECT FINAL PASS OF ALL WELDS. ACCEPTANCE CRITERIA SHALL BE:

      1. NO CRACKS.
      2. COMPLETE FUSION SHALL EXIST BETWEEN WELD METAL AND BASE METAL UNDERCUT SHALL NOT EXCEED 0.01" FOR MATERIAL, 0.01" FOR MATERIALS 0.01" AND MATERIALS NOT TO EXCEED 0.01".
      3. FOR ALL WELDS, THE SUM OF WELDING SEAM WAS 0.5" OR GREATER IN LENGTH SHALL NOT EXCEED 0.01" IN ANY LINEAR INCH OF WELD AND SHALL NOT EXCEED 0.01" IN ANY INCH OF WELD.
      4. ALL CRACKS SHALL BE FILLED TO THE FULL CROSS-SECTION OF THE WELD EXCEPT END OF WELD. THERE EFFECTIVE LENGTH.
NOTES:

1. REMOVE ALL BURRS AND SHARP EDGES.
2. ALL MACHINED FIVEhält OK MAXIMUM UNLESS OTHERWISE NOTED.
3. FINAL ASSEMBLY SHALL BE FREE OF DIRT, DIRT, MACHINES, FILM, EAGLE, SCALE, 
   DEEP, SORBS, ETC., FOR LIFE-USE, 50 PERCENT OF BAR AND ACID.

4. WELDING SHALL BE DONE IN ACCORDANCE WITH ASME B & PV CODE,
   SECTION 9. THE WELDING PROCESS USED SHALL BE P/F PARTIAL, FITTED,
   MATERIALS CONFORMING TO SPECIFICATION S201001604-01 FOR ON-SITE Fabrication.

5. VISUALLY INSPECT ALL WELDS IN ACCORDANCE WITH ASME B&PV CODE.
   SECTION 9. ART. 8 BY DO-OFF, FABRICATION OR VISUALLY INSPECT ALL
   WELDS IN ACCORDANCE WITH THE PERTINENT TRASH EXAMINATION.
   VISUAL EXAMINATION OF WELDS SHALL BE IN ACCORDANCE WITH THE
   ACCEPTANCE CRITERIA FOR THE WELDS AS PER APPENDIX B, "ACCEPTANCE CRITERIA
   FOR ON-SITE Fabrication." 

6. LIQUID PENETRANT EXAMINATION FOR OFF-SITE FABRICATION SHALL BE PERFORMED
   IN ACCORDANCE WITH THE ASME B&PV CODE SECTION 9. ARTICLE 8 IS ACCEPTANCE
   A. ALL SURFACES TO BE EXAMINED SHALL BE FREE OF
   I. RELEVANT LINE INDICATIONS
   II. RELEVANT ROUND INDICATIONS GREATER THAN 5 MM (0.2")
   III. FOUR OR MORE RELEVANT INDICATIONS IN A LINE
   B. CRACKS OR INDICATIONS IN ACCESS SPECIFIC TO SURFACE
   CONDITIONS ARE UNACCEPTABLE.

LIQUID PENETRANT EXAMINATION FOR ON-SITE FABRICATION SHALL BE PERFORMED
AND WELDING EXAMINATION OF RELEVANT WELDS PER ASME B&PV CODE,
SECTION 9. ARTICLE 8 IS ACCEPTANCE IN ACCORDANCE WITH THE
WELDING EXAMINATION. ACCEDE TO ACCEPTANCE CRITERIA FOR
ASME B&PV CODE, SECTION III.A.1.C. WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 4
FOR ON-SITE FABRICATION.

7. VISUALLY EXAMINE ALL WELDS IN ACCORDANCE WITH ASME B&PV CODE,
   SECTION 9. ARTICLE 8. VISUALLY EXAMINE ALL WELDS IN ACCORDANCE WITH
   THE PERTINENT TRASH EXAMINATION. VISUAL EXAMINATION OF WELDS SHALL BE
   IN ACCORDANCE WITH THE ACCEPTANCE CRITERIA FOR THE WELDS AS PER
   APPENDIX B, "ACCEPTANCE CRITERIA FOR ON-SITE Fabrication."

8. LIQUID PENETRANT EXAMINATION FOR OFF-SITE FABRICATION SHALL BE PERFORMED
   IN ACCORDANCE WITH THE ASME B&PV CODE SECTION 9. ARTICLE 8 IS ACCEPTANCE
   A. ALL SURFACES TO BE EXAMINED SHALL BE FREE OF
   I. RELEVANT LINE INDICATIONS
   II. RELEVANT ROUND INDICATIONS GREATER THAN 5 MM (0.2")
   III. FOUR OR MORE RELEVANT INDICATIONS IN A LINE
   B. CRACKS OR INDICATIONS IN ACCESS SPECIFIC TO SURFACE
   CONDITIONS ARE UNACCEPTABLE.

LIQUID PENETRANT EXAMINATION FOR ON-SITE FABRICATION SHALL BE PERFORMED
AND WELDING EXAMINATION OF RELEVANT WELDS PER ASME B&PV CODE,
SECTION 9. ARTICLE 8 IS ACCEPTANCE IN ACCORDANCE WITH THE
WELDING EXAMINATION. ACCEDE TO ACCEPTANCE CRITERIA FOR
ASME B&PV CODE, SECTION III.A.1.C. WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 4
FOR ON-SITE FABRICATION.

9. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH ASME B & PV CODE,
   SECTION 9. THE WELDING PROCESS USED SHALL BE P/F PARTIAL, FITTED,
   MATERIALS CONFORMING TO SPECIFICATION S201001604-01 FOR ON-SITE Fabrication.

10. VISUALLY INSPECT ALL WELDS IN ACCORDANCE WITH ASME B&PV CODE.
    SECTION 9. ART. 8 BY DO-OFF, FABRICATION OR VISUALLY INSPECT ALL
    WELDS IN ACCORDANCE WITH THE PERTINENT TRASH EXAMINATION.
    VISUAL EXAMINATION OF WELDS SHALL BE IN ACCORDANCE WITH THE
    ACCEPTANCE CRITERIA FOR THE WELDS AS PER APPENDIX B, "ACCEPTANCE CRITERIA
    FOR ON-SITE Fabrication."

11. LIQUID PENETRANT EXAMINATION FOR OFF-SITE FABRICATION SHALL BE PERFORMED
    IN ACCORDANCE WITH THE ASME B&PV CODE SECTION 9. ARTICLE 8 IS ACCEPTANCE
    A. ALL SURFACES TO BE EXAMINED SHALL BE FREE OF
    I. RELEVANT LINE INDICATIONS
    II. RELEVANT ROUND INDICATIONS GREATER THAN 5 MM (0.2")
    III. FOUR OR MORE RELEVANT INDICATIONS IN A LINE
    B. CRACKS OR INDICATIONS IN ACCESS SPECIFIC TO SURFACE
    CONDITIONS ARE UNACCEPTABLE.

LIQUID PENETRANT EXAMINATION FOR ON-SITE FABRICATION SHALL BE PERFORMED
AND WELDING EXAMINATION OF RELEVANT WELDS PER ASME B&PV CODE,
SECTION 9. ARTICLE 8 IS ACCEPTANCE IN ACCORDANCE WITH THE
WELDING EXAMINATION. ACCEDE TO ACCEPTANCE CRITERIA FOR
ASME B&PV CODE, SECTION III.A.1.C. WELD PROCEDURE SPECIFICATION S2.0 USING ITEM 4
FOR ON-SITE FABRICATION.
NOTES:

1. REMOVE ALL SLITTS AND SHARP EDGES.
2. ALL MACHINES MUST HAVE 99.99% DRY AIR.
3. FINAL ASSEMBLY SHALL MEET CLEANLINESS REQUIREMENTS OF STANDARDS:
   a. 3.0

4. MARK PER STD-7006-2A OR STD-7006-2D IN 1/2" HIGH CHARACTERS WITH INK OR OTHER HIGH-PURITY LOW-CHLORIDE BLACK INK THAT COMPLIES WITH SANFORD T.E.C. MARKER #13401 OR #13501, ITW DYMON FORMULA Q404.

5. VERIFY MARKINGS HAVE BEEN ACCURATELY APPLIED AND RECORD THE MARKED WEIGHT.
6. MEASURED WEIGHT.

7. VISUALLY INSPECT ALL WELDS IN ACCORDANCE WITH ASME B & PV CODE
   a. 6.

8. LIQUID PENETRANT EXAMINATION SHALL BE PERFORMED ON ALL WELDS IN ACCORDANCE WITH ASME B & PV CODE, SECTION V, ARTICLE 9.

9. COMPLETED ASSEMBLY SHALL UNDERGO A PNEUMATIC LEAK TEST IN ACCORDANCE WITH ASME B & PV CODE SECTION V, ARTICLE 10 AT A PRESSURE OF 16.5 TO 18.5 PSIG.

10. DESIGN TEMPERATURE: 300°F.

11. DESIGN PRESSURE: FULL VACUUM TO 15 PSIG.
NOTES:
1. ARS-3 BOX CONSTRUCTION MATERIALS LEXAN MR10 OR GLASS, AND STAINLESS STEEL.
2. THE CONTAMINATION PAN IS PLUGGED WHEN THE ARS DRAIN BOTTLE IS NOT IN USE.
3. THE ARS DRAIN BOTTLE AND SECONDARY CONTAINMENT TRAY WILL BE INSTALLED FOR WASTE STREAMS HAVING CRITICAL SAFETY CONTROLS.
4. DIMENSIONS OF THE ARS WILL BE DEPENDENT ON THE WASTE BEING TREATED. THE SECONDARY CONTAINMENT ASSOCIATED WITH THE TREATMENT BEING PERFORMED WILL MAINTAIN 100% OF THE WASTE GENERATED DURING TREATMENT.
5. WHEN THE DRAIN BOTTLE IS CONNECTED, THE TRAY THE BOTTLE SITS IN BECOMES THE SECONDARY CONTAINMENT SINCE THE ARS BOTTOM NO LONGER RETAIN ANY LIQUID.

ARS-3 BOX
WITH SIDE LOAD WALL

ARS-3 BOX
WITH OPTIONAL REMOVABLE SOLID WALL

PAN DRAIN WITH SST HOSE COUPLING WITH SELF-PLUGGING VALVE WHEN DRAIN BOTTLE IS DISCONNECTED.

PAN DRAIN WITH SST HOSE COUPLING WITH SELF-PLUGGING VALVE WHEN DRAIN BOTTLE IS DISCONNECTED.

ARGON CONNECTION

ARGON CONNECTION

NOTES:
1. ARS-3 BOX CONSTRUCTION MATERIALS LEXAN MR10 OR GLASS, AND STAINLESS STEEL.
2. THE CONTAMINATION PAN IS PLUGGED WHEN THE ARS DRAIN BOTTLE IS NOT IN USE.
3. THE ARS DRAIN BOTTLE AND SECONDARY CONTAINMENT TRAY WILL BE INSTALLED FOR WASTE STREAMS HAVING CRITICAL SAFETY CONTROLS.
4. DIMENSIONS OF THE ARS WILL BE DEPENDENT ON THE WASTE BEING TREATED. THE SECONDARY CONTAINMENT ASSOCIATED WITH THE TREATMENT BEING PERFORMED WILL MAINTAIN 100% OF THE WASTE GENERATED DURING TREATMENT.
5. WHEN THE DRAIN BOTTLE IS CONNECTED, THE TRAY THE BOTTLE SITS IN BECOMES THE SECONDARY CONTAINMENT SINCE THE ARS BOTTOM NO LONGER RETAIN ANY LIQUID.
NOTES:

1. ARS BOX WALLS ARE CONSTRUCTED OF LEXAN MR10, OR GLASS, AND STAINLESS STEEL.

2. SPECIFIC DIMENSIONS OF THE ARS WILL BE DEPENDENT ON THE WASTE BEING TREATED. THE SECONDARY CONTAINMENT ASSOCIATED WITH THE TREATMENT WILL MAINTAIN 100% OF THE WASTE GENERATED DURING TREATMENT.

1. ARS BOX WALLS ARE CONSTRUCTED OF LEXAN MR10, OR GLASS, AND STAINLESS STEEL.

2. SPECIFIC DIMENSIONS OF THE ARS WILL BE DEPENDENT ON THE WASTE BEING TREATED. THE SECONDARY CONTAINMENT ASSOCIATED WITH THE TREATMENT WILL MAINTAIN 100% OF THE WASTE GENERATED DURING TREATMENT.
HWMA/RCRA PART B PERMIT
FOR THE IDAHO NATIONAL LABORATORY

Volume 18 – Idaho Nuclear Technology and Engineering Center

APPENDIX 3

Debris Treatment Processes
Holdup and Collection Tanks
CPP-659/-1659 Storage
CPP-666 FDP Cell Container Storage and Slab Tank Storage
Other Miscellaneous Treatment Processes
RMWSF (CPP-1617) Container Storage Area

HIGH DENSITY CONCRETE
CONSTRUCTION SPECIFICATION

Effective Date: April 27, 2009
<table>
<thead>
<tr>
<th>REVISION</th>
<th>DATE</th>
<th>DESCRIPTION</th>
<th>APPROVED BY</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8/23/77</td>
<td>Approved For Construction</td>
<td>O. B. Dorin</td>
<td>8/23/77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACC</td>
<td></td>
</tr>
</tbody>
</table>

**Fluor Engineers and Constructors, Inc.**

**Contract E (10-1)-1495**

**U.S. Energy Research & Development Administration**

New Waste Calcining Facility, INEL

**Specifications SP-453504-10-2**

**High Density Concrete Construction**

**Approved For Construction**

---

**Allied Chemical Corporation**

Idaho Chemical Programs - Operations Office

Idaho Falls, Idaho

This document is released 8-31-77 and subsequently controlled in accordance with ACC standard practices.
SPECIFICATION SP-453504-10-2
HIGH DENSITY CONCRETE CONSTRUCTION

CONTENTS

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOPE</td>
<td>1</td>
</tr>
<tr>
<td>REFERENCE SPECIFICATIONS, CODES AND STANDARDS</td>
<td>1</td>
</tr>
<tr>
<td>HIGH DENSITY CONCRETE MATERIALS</td>
<td>2</td>
</tr>
<tr>
<td>4.0 REINFORCEMENT</td>
<td>6</td>
</tr>
<tr>
<td>EMBEDDED ITEMS</td>
<td>6</td>
</tr>
<tr>
<td>PROPORTIONING</td>
<td>7</td>
</tr>
<tr>
<td>7.0 MIXING</td>
<td>8</td>
</tr>
<tr>
<td>8.0 PLACING HIGH DENSITY CONCRETE</td>
<td>8</td>
</tr>
<tr>
<td>9.0 FORMWORK</td>
<td>10</td>
</tr>
<tr>
<td>10.0 FINISHING</td>
<td>10</td>
</tr>
<tr>
<td>11.0 JOINTS</td>
<td>11</td>
</tr>
<tr>
<td>12.0 GROUT AND DRYPACKING</td>
<td>11</td>
</tr>
<tr>
<td>13.0 EPOXY GROUTING</td>
<td>11</td>
</tr>
<tr>
<td>COLD WEATHER CONCRETING</td>
<td>11</td>
</tr>
<tr>
<td>HOT WEATHER CONCRETING</td>
<td>11</td>
</tr>
<tr>
<td>INSPECTION AND TESTING</td>
<td>11</td>
</tr>
<tr>
<td>CURING AND PROTECTION</td>
<td>12</td>
</tr>
<tr>
<td>18.0 QUALITY CONTROL</td>
<td>12</td>
</tr>
</tbody>
</table>
SPECIFICATION SP-453504-10-2
HIGH DENSITY CONCRETE CONSTRUCTION

1.0 SCOPE

1.1 General

1.1.1 Except as otherwise noted herein, high density concrete shall meet all requirements of Specification SP-453504-10-1, Concrete Construction, pertaining to regular concrete.

1.1.2 High Density Concrete shall be placed only at the locations and to the extent shown or noted on the engineering drawings.

1.1.3 The Contractor shall provide all labor, equipment, transportation, and materials required to perform all poured in-place high density concrete work for the New Waste Calcining Facility at the Idaho National Engineering Laboratory near Idaho Falls, Idaho.

1.2 The work shall include, but is not necessarily limited to, the following:

(1) Placing of anchor bolts, support angles and other embedded items as shown on drawings.

(2) High density concrete grouting.

2.0 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

The following publications of the issue shown form a part of this specification to the extent indicated by references thereto. Where no issue date is shown, the latest edition of the publication shall apply:

2.1 Fluor Engineers and Constructors, Inc., Specification

SP-453504-10-1 Concrete Construction

2.2 Codes and Standards

(1) American Concrete Institute (ACI)

ACI 211.1-74 Recommended practice for Selecting Proportions for Normal and Heavyweight Concrete

ACI 309-72 Recommended Practice for Consolidation of Concrete
2.2 (Continued)

(1) (Continued)

ACI 318-71 Building Code Requirements for Reinforced Concrete

(2) American Society for Testing and Material (ASTM)

ASTM-C-127-73 Specific Gravity and Absorption of Coarse Aggregate

ASTM-C-128-73 Specific Gravity and Absorption of Fine Aggregate

ASTM-C-150-76 Portland Cement

ASTM-C-494-71 Chemical Admixtures for Concrete

ASTM-C-637-73 Aggregate for Radiation - Shielding Concrete

2.3 In case of conflict, the following order of precedence shall apply:

(1) Drawings

(2) This Specification, SP-453504-10-2, High Density Concrete Construction

Specification SP-453504-10-1, Concrete Construction

(4) Codes and Standards

2.4 Where reference is made, in the above reference specifications, codes and standards, to "Building Official, Engineer or Responsible Authority," these terms shall be considered as synonymous with the ERDA Contracting Officer or his representative.

3.0 HIGH DENSITY CONCRETE MATERIALS

3.1 Cement

Cement shall be low alkali conforming to ASTM C-150, Type I-II. One brand and type of cement shall be selected and used throughout the NWCF project. All cement shall be a certified brand, and shall be sampled, tested and approved by the Contracting Officer. Certified mill test reports from the approved supplier may be accepted in lieu of tests by the Contracting Officer at his option. Only tested and approved cement shall be used.
3.2 Aggregate

3.2.1 The fine and coarse aggregate shall be crushed magnetite aggregates.

3.2.2 One source of aggregate shall be selected and used throughout the work, supported by test and investigation reports, and shall be approved by the Contracting Officer.

3.2.3 The bulk specific gravity of the aggregates shall be 4.5 minimum (saturated, surface dry). Specific gravities shall be determined as defined in ASTM designation C-127 for coarse aggregate and ASTM designation C-128 for fine aggregate. The specific gravity of any shipment shall not differ by more than 3 percent of the average bulk specific gravity of the aggregate supplied as samples and used for the concrete design mix.

3.2.4 Maximum absorption of the aggregate shall be 2 percent.

3.2.5 The aggregate shall conform to ASTM C-637, except for the following modifications:

a. Paragraph 3.3 "Fixed Water Content of Hydrous Ores," not applicable.

b. Paragraph 5 and 6 test for "Deleterious Substances" and "Abrasion Resistance of Coarse Aggregate." These tests shall be performed only on the first aggregate test samples obtained for determining the aggregate suitability to be used for the high density concrete, see Paragraph 3.2.6 "Aggregate Certification" of this Specification. In successive samples and/or shipments of aggregates, the sample taken to the testing laboratory shall be inspected only to see if they comply with uniformity and quality, in respect to "Deleterious Substances" and "Abrasion Resistance," of the first aggregate test samples tested. In the event that it is apparent that there is no compliance, the shipment shall be tested as specified in Paragraphs 5 and 6 and/or rejected.

c. The aggregates shall be graded within the following limits:
3.2.5.1 **Fine Aggregate**

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8 inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>95 - 100</td>
</tr>
<tr>
<td>No. 8</td>
<td>70 - 100</td>
</tr>
<tr>
<td>No. 16</td>
<td>45 - 85</td>
</tr>
<tr>
<td>No. 30</td>
<td>25 - 60</td>
</tr>
<tr>
<td>No. 50</td>
<td>10 - 35</td>
</tr>
<tr>
<td>No. 100</td>
<td>2 - 20</td>
</tr>
<tr>
<td>No. 200</td>
<td>0 - 10</td>
</tr>
</tbody>
</table>

The fineness modulus shall not be less than 2.3 or more than 3.1. The grading of fine aggregate shall be controlled so that the fineness moduli of the test samples shall not vary more than 0.20 from the average fineness modulus of all samples previously taken. The fineness modulus shall be determined by dividing 100 the sum of the cumulative percentages retained on sieves Numbers 4, 8, 16, 30, 50 and 100.

3.2.5.2 **Coarse Aggregate** shall be 3/4 inch maximum size.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch</td>
<td>100</td>
</tr>
<tr>
<td>3/4 inch</td>
<td>90 - 100</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>50 - 75</td>
</tr>
<tr>
<td>3/8 inch</td>
<td>20 - 55</td>
</tr>
<tr>
<td>No. 4</td>
<td>0 - 10</td>
</tr>
</tbody>
</table>

3.2.5.3 The above fine and coarse aggregate gradation represents the extreme limits which shall determine suitability of the aggregates to be used for the high density concrete. An acceptable degree of uniformity shall be maintenance of fineness modulus of successive samples and shipments with plus or minus 0.20 of the originally accepted sample.

3.2.6 **Aggregates Certification**

The Contractor shall obtain test samples of the fine and coarse aggregates for determining their suitability to be used for the high density concrete. The aggregates shall be tested in accordance with the requirements specified herein. The Contractor shall submit the test results to Contracting Officer and obtain his approval, in writing, prior to ordering
3.2.6 (Continued)

and shipment of the aggregate. All tests shall be conducted by the testing laboratory, approved by the Contracting Officer. The Contractor shall provide the tests in conformance with the Method of Sampling and Testing specified in and referred by ASTM C-637, except as otherwise provided within this specification.

3.2.7 Aggregates Testing

Any new shipment of samples or delivery of fine or coarse aggregates shall be retested in accordance with this specification for compliance with the requirements and uniformity of the shipments. Failure of the delivered aggregate to pass these tests or meet the requirements shall be a cause for rejection, unless suitable adjustments or recommendations are made in proportions of fine and coarse aggregate. These recommendations and adjustments shall be made by the testing laboratory and submitted in writing by the Contractor to the Contracting Officer for his approval.

Any new shipment of fine or coarse aggregate shall not be released for use, nor mixed with previous shipments until acceptable test results have been obtained.

3.2.8 Frequency of Aggregate Testing

3.2.8.1 A minimum of one set of tests for every new shipment of samples or delivery of aggregates.

3.2.8.2 A minimum of one set of tests for every 100 tons of fine or coarse aggregate delivered.

3.2.8.3 Additional tests may be required by the Contracting Officer or the testing laboratory, to insure aggregate shipment uniformity.

3.2.8.4 The Contractor shall inform the Contracting Officer, in writing, of any failure of the aggregate shipment, or fraction of a shipment, to meet the requirements of this specification. Any noncompliance with the requirements may be a cause for rejection of a specific shipment, unless the testing laboratory can recommend suitable adjustments in the design mix proportions, and those adjustments are approved in writing by the Contracting Officer.
3.2.9 Shipment and Storage of Aggregates

Aggregates should be shipped, handled, and stored in a manner which will assure little loss of fine aggregates, no contamination by foreign material, and no significant aggregate breakage or segregation.

Coarse and fine aggregate shall be shipped separately. Aggregates may be shipped in heavy wood boxes, watertight bags, steel containers, or in bulk by railroad cars or trucks. Storage should be as near the batch plant as possible. The size, coarse or fine, and weight of the aggregate in each container shall be plainly marked on the container.

Water

Mixing water shall be potable and free from injurious amounts of oils, acids, alkalis, salts, organic materials or other deleterious substances.

Admixtures

3.4.1 Water reducing admixtures shall conform to ASTM C-494, Type A or D.

3.4.2 Air-entraining admixture shall not be used in high density concrete without recommendation of the testing laboratory and written approval of the Contracting Officer. The use of air-entraining admixtures tends to decrease the density of the concrete.

3.4.3 Calcium chloride or admixtures containing chlorides shall not be used in concrete without approval of the Contracting Officer.

4.0 REINFORCEMENT

The Contractor shall conform to the requirements of Specification SP-453504-10-1, "Concrete Construction," Paragraph 4.0, "Reinforcement," except that in Subparagraph 4.4.2 the precast concrete blocks embedded in high density concrete shall be made of high density concrete. The bonding grout and patching mortar shall be made of magnetic aggregates, see Paragraph 10.0 of this specification.

5.0 EMBEDDED ITEMS

The Contractor shall conform to the requirements of Specification SP-453504-10-1, Paragraph 5.0, except that Subparagraph 5.3 shall be deleted.
6.0 PROPORTIONING

General

Concrete shall be proportioned as set forth in ACI-211.1 and shall meet the quality requirements as set forth in ACI 318, except as modified herein. The Contractor shall submit his concrete design mix for approval to the Contracting Officer prior to use.

Concrete Properties

6.2.1 The specified compressive strength of concrete, $f'_c$, shall be 4,000 psi based on 28-day tests.

6.2.2 The minimum unit weight of the high density concrete shall be 220.5 pounds per cubic foot.

6.2.3 Concrete with crushed magnetite aggregates, 3/4 inch maximum size, shall be used for all high density concrete work unless otherwise noted on the drawings or approved by the Contracting Officer. The concrete design mix shall contain the maximum quantity of coarse aggregate consistent with workability and method of placement.

6.2.4 High density concrete slump shall range within the following unit:

- Reinforced slabs, precast hatch beams, columns and walls, 2 to 4 inches.

If concrete pumping is to be used, then slump may be increased up to 2 inches over the above limits, with specific prior approved by the Contracting Officer. The modified design mix for pumped concrete must be designed and tested by the testing laboratory and shall be approved by the Contracting Officer.

6.2.5 Concrete Air Content

- Entrapped air shall be considered in the concrete mix; however, air-entraining admixture or air-entraining Portland cement shall not be used, see Paragraph 3.4.2.

6.2.6 The concrete mix shall contain a water-reducing admixture, added in the proportions recommended by the admixture manufacturer and the design mix testing laboratory, and as approved by the Contracting Officer.
6.3 Design Mix Based on Laboratory Trial Batches

6.3.1 The design mix shall be determined on the basis of testing laboratory trial batches test as outlined in Paragraph 4.2.3 of ACI 318 and ACI 211.1. The testing laboratory and the recommended design mix or mixes shall be approved in writing by the Contracting Officer.

6.3.2 The proposed design mix for placed concrete shall be noted, if it is suitable for pumping. If it is not suitable, then a modified special design mix for pumping shall be tested and approved by the Contracting Officer.

7.0 MIXING

General

The Contractor shall conform to the requirements of Specification SP-453504-10-1, Paragraph 7.0, except for the following additional considerations and requirements.

Concrete Mixing Equipment

Standard mixing equipment may be used to mix the high density concrete. Special care shall be taken not to overload the equipment. In general, the allowable volume of high density concrete mixed shall be equivalent to the mix weight of normal density concrete rather than the volume capacity of the mixing equipment. Transporting high density concrete without agitation tends to cause excessive consolidation or packing, and therefore shall be avoided.

8.0 PLACING HIGH DENSITY CONCRETE

General

Placement of the mixed high density concrete shall be subjected to the same considerations of quality control as for normal density concrete. The Contractor shall conform to the applicable requirements of Specification SP-453504-10-1, Concrete Construction, Paragraph 8.0, except for the following additional considerations and requirements.

The mixed high density concrete is far more susceptible to variations in quality due to improper handling. It is particularly subject to segregation during placement. Segregation of high density concrete results not only in variation of strength, but also in variations in density, as lighter materials such as cement, water, and air will displace heavier high density aggregates. This adversely affects shielding properties.
8.3 The placement of high density concrete is frequently required in areas which are congested with reinforcing steel, penetrations, and blockout.

Placement conditions dictate the strictest observance of good placement practice. Because of the complexity of forms and embeddings, it is usually necessary to avoid pump or "drop-pipe" placement techniques in areas which are inaccessible to direct observation by workmen at all times. However, in other accessible areas, if the mixes are proportioned properly, they are pumpable and will pump better at a lower slump than normal weight concrete.

Placing the high density concrete by pumping is not recommended because of the tendency of the aggregates to segregate. However, if the Contractor chose to use pumping for specific areas, he should use only the mix design that was approved for pumping, see Subparagraphs 6.2.4 and 6.3.2. The pumping operation shall be done only by experienced workmen. The flow of the concrete shall be observed at all times to notice and immediately correct any tendency of the aggregate to segregate.

Use of long, rigid chutes or drop pipes shall be avoided. Where concrete must be placed in narrow forms or through restricted areas, a short flexible type drop chute which tends to collapse and restrain the fall of high density concrete should be employed.

8.6 The entire Subparagraph 8.5 of Specification SP-453504-10-1 shall be substituted by the following requirements:

In placing the high density concrete the height of the force-fall drop of the concrete shall be no more than 4 feet, as measured from the end of the chute, trunk, bucket, etc., to the top surface of the existing or previously poured concrete. This can be accomplished by the use of pour holes in the forms, chutes, buckets, trunks, or any other acceptable method. The stream of concrete should not separate by permitting it to fall freely over rods, spacers, reinforcement, or other embedded material.

8.7 High density concrete usually will not "flow" in a form and must be placed in each discrete area and compacted in place with a minimum of vibration. Under no circumstances should an attempt be made to move high density concrete with vibration equipment.

Layers of placed high density concrete shall be limited to a maximum 12 inches.

High-Density Concrete Consolidation

8.9.1 Consolidation shall conform to ACI 309, "Recommended Practice for Consolidation of Concrete," Chapter 14.
8.9.2 Internal vibrators shall be used to achieve uniform and optimum density. Vibrator frequencies used for normal concrete are usually satisfactory for heavy concrete. However, somewhat higher frequencies, about 11,000 vibrations per minute (180 Hz), together with shorter vibration periods have sometimes been found to reduce the tendency for segregation. Over vibration shall be avoided, since this causes settlement of the heavy particles.

8.9.3 In high density concrete, vibrators have a smaller effective area, or radius of action than in normal concrete; therefore, greater care must be exercised to ensure that the concrete is properly consolidated. Vibrators shall be inserted at closer spaced intervals than for normal concrete and only to a depth sufficient to cause complete intermixing of adjacent layers.

8.9.4 Vibration and revibration to remove entrapped air and to establish aggregate-to-aggregate contact may cause an excess amount of grout to collect on the top of the placed lift surfaces. If this occurs, the lower density grout should be removed from the upper surface at the completion of each placement while the concrete is still in a plastic state.

9.0 FORMWORK

9.1 General

The Contractor shall conform to the requirements of Specification SP-453504-10-1, Paragraph 9.0, except for the following additional considerations and requirements.

The form designer shall be aware that formwork for conventionally placed high density concrete must necessarily be stronger than comparable formwork for ordinary concrete simply by reason of increased concrete density.

9.3 The form designer shall also be aware that all sleeves, penetrations and blockouts and their related strutting and bracing systems must be carefully designed for the increased concrete density, to insure their integrity and alignment.

10.0 FINISHING

The Contractor shall conform to the requirements of Specification SP-453504-10-1 "Concrete Construction," Paragraph 10.0 "Finishing," except that in Subparagraph 10.1.2, the fine sand for the bonding grout and the fine aggregate for the patching mortar shall be magnetite aggregate.
11.0 JOINTS

The Contractor shall conform to the requirements of Specification SP-453504-10-1 "Concrete Construction," Paragraph 11.0 "Joints."

12.0 GROUT AND DRYPACKING

12.1 General

The Contractor shall conform to the requirements of Specification SP-453504-10-1, Paragraph 12.0, except for the following additional considerations and requirements.

12.2 Normal Weight Nonshrink Grout

The nonshrink grout as specified in Specification SP-453504-10-1, Subparagraph 12.1, may be used for bedplates, equipment bases and similar uses where this grout is not an integrated part of the thickness required for shielding, or in no way will affect shielding properties requirements.

12.3 Normal Weight Drypacking

Drypacking as specified in Specification SP-453504-10-1, Subparagraph 12.2, with normal weight sand shall be used only where called for on the drawings. This grout may be used only where it is not an integrated part of the thickness required for shielding, or in no way will affect the shielding properties requirement.

EPOXY GROUTING

The Contractor shall conform to the same requirements as specified in Specification SP-453504-10-1, Paragraph 13.0.

COLD WEATHER CONCRETING

The Contractor shall conform to the requirements as specified in Specification SP-453504-10-1, Paragraph 14.0.

HOT WEATHER CONCRETING

The Contractor shall conform to the requirements as specified in Specification SP-453504-10-1, Paragraph 15.0.

INSPECTION AND TESTING

The Contractor shall conform to the requirements as specified in Specification SP-453504-10-1, Paragraph 16.0.
17.0 CURING AND PROTECTION

The Contractor shall conform to the same requirements as specified in Specification SP-453504-10-1, Paragraph 17.0.

18.0 QUALITY CONTROL

General

The Contractor and the Contracting Officer shall be aware of the utmost importance that a thorough quality control program shall be maintained prior to the start of construction and throughout the duration of construction. This specification shall be strictly enforced and any deviation or noncompliance shall be immediately reported in writing to the Contracting Officer.

18.2 A sensitive balance exists between the three major requirements:

a. Specified strength of the concrete.

b. Specified high unit weight of the concrete for shielding.

c. A limit on excessive unit weight of the concrete because of the weight limitation for lifting the hatches.

Any noncompliance with any item of this specification or any unauthorized "field adjustment" in the design mix, placement, etc., may result in disturbing this balance.

Any attempt to increase strength by adding cement, will displace the heavier aggregate, and adversely affect shielding properties.

18.4 Any attempt to increase the unit weight of the concrete by increasing the percent of heavy magnetite aggregate in the mix and decreasing the lighter materials such as water, cement and entrapped air, may result in reduced strength and cause the hatches to become overweight for lifting.

Any noncompliance with the mixing and/or placing requirement may result in reduction of the concrete strength and may create areas of defective shielding properties.
HWMA/RCRA PART B PERMIT
FOR THE IDAHO NATIONAL LABORATORY

Volume 18 – Idaho Nuclear Technology and Engineering Center

APPENDIX 4

Debris Treatment Processes
Holdup and Collection Tanks
CPP-659/-1659 Storage
CPP-666 FDP Cell Container Storage and Slab Tank Storage
Other Miscellaneous Treatment Processes
RMWSF (CPP-1617) Container Storage Area

STRUCTURAL STEEL SPECIFICATION

Effective Date: April 27, 2009
### SPECIFICATION SP-453504-20-1
#### STRUCTURAL STEEL

<table>
<thead>
<tr>
<th>REV.</th>
<th>DATE</th>
<th>DESCRIPTION</th>
<th>APPROVED BY</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>11-24-76</td>
<td>Issued &quot;Approved for Construction&quot;</td>
<td>ORIG</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>See attached</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR Rev. 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>coversheet</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLOOR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACC</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3-25-77</td>
<td>Revised and reissued &quot;Approved for Construction&quot; per DCN No. 58-1</td>
<td>ORIG</td>
<td>3-25-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>3-25-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>3-25-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>3-25-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>3-25-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACC</td>
<td>3-25-77</td>
</tr>
<tr>
<td>2</td>
<td>6-16-77</td>
<td>Revised and reissued &quot;Approved for Construction&quot; per DCN No. 100-1</td>
<td>ORIG</td>
<td>6-20-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>6-20-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>6-20-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>6-20-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>6-20-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACC</td>
<td>6-20-77</td>
</tr>
<tr>
<td>3</td>
<td>10-20-77</td>
<td>Revised and reissued &quot;Approved for Construction&quot; per DCN No. 190-1</td>
<td>ORIG</td>
<td>10-20-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>10-20-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>10-20-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FLUOR</td>
<td>10-20-77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACC</td>
<td>10-20-77</td>
</tr>
</tbody>
</table>

---

ALLIED CHEMICAL CORPORATION
IDAHO CHEMICAL PROGRAMS - OPERATIONS OFFICE
IDAHO FALLS, IDAHO

THIS DOCUMENT IS RELEASED 12-1-76
AND SUBSEQUENTLY CONTROLLED IN ACCORDANCE WITH ACC STANDARD PRACTICES.
SPECIFICATION SP-453504-20-1
STRUCTURAL STEEL

The attached specification, revised as indicated below is issued herewith. If this is a later revision than now in your possession, please destroy previous issue.

Revision No. 0 Date 11-24-76 Pages All
Revision No. Date Pages
Revision No. Date Pages
Revision No. Date Pages
Revision No. Date Pages
Revision No. Date Pages

NOTE: New Issue
Revised sheets only attached
Entire specification reissued X

Originated Ramzi G. Saaty Date 11-4-76
Approved by Date 11-24-76
Approved by Date
Approved by Date 11-2-76
ACC Approved by Date 12-1-76

ALLIED CHEMICAL CORPORATION
IDAHO CHEMICAL PROGRAMS - OPERATIONS OFFICE
IDAHO FALLS, IDAHO

THIS DOCUMENT IS RELEASED 12-1-76 AND SUBSEQUENTLY CONTROLLED IN ACCORDANCE WITH ACC STANDARD PRACTICES.
<table>
<thead>
<tr>
<th>CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
</tr>
<tr>
<td>1.0 SCOPE</td>
</tr>
<tr>
<td>2.0 REFERENCE SPECIFICATIONS, CODES AND STANDARDS</td>
</tr>
<tr>
<td>3.0 MATERIALS</td>
</tr>
<tr>
<td>DETAILS AND FABRICATION</td>
</tr>
<tr>
<td>INSTALLATION OF HIGH STRENGTH BOLTS</td>
</tr>
<tr>
<td>STEEL DECKING</td>
</tr>
<tr>
<td>7.0 METAL GRATING AND TREADS</td>
</tr>
<tr>
<td>8.0 MISCELLANEOUS METAL</td>
</tr>
<tr>
<td>STAINLESS STEEL</td>
</tr>
<tr>
<td>DISSIMILAR MATERIALS</td>
</tr>
<tr>
<td>11.0 PREFORMED METAL SIDING</td>
</tr>
<tr>
<td>12.0 SUBSTITUTIONS</td>
</tr>
<tr>
<td>13.0 INSPECTION</td>
</tr>
</tbody>
</table>
SPECIFICATION SP-453504-20-1

STRUCTURAL STEEL

1.0 General

The Contractor shall provide all labor and material to fabricate and erect structural steel in accordance with design drawings and this specification for the proposed New Waste Calcining Facility at the Idaho National Engineering Laboratory near Idaho Falls, Idaho.

The work shall also include, but not be limited to, the following:

1. Structural steel.
2. Steel decking.
3. Bridge crane steel supports, rails and stops.
4. Ladders, handrails and guardrails.
5. All metal grating and treads, including banding and fasteners.
7. Complete shop detail drawings with bills of material.
8. Erection drawings with field welds indicated.
10. Common and high-strength bolts.
12. Grout plates, slide plates, anchor bolts and other items to be embedded in concrete.
13. Miscellaneous metal
15. Stairs
2.0 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

The following publications of the issue shown form a part of this specification to the extent indicated by the reference thereto. Where no issue date is shown, the latest edition of the publication in effect on the Purchase Order shall apply:

2.1 Fluor Engineers and Constructors Specifications

SP-453504-20-2 Stainless Steel
SP-453504-30-1 Painting and Protective Coating
SP-453504-90-13 Structural Welding Shop and/or Field

2.2 Codes and Standards

(1) American Institute of Steel Construction (AISC)


(2) American Society for Testing and Materials (ASTM)


ASTM-A501 Hot-Formed Welded and Seamless Carbon Structural Steel Tubing, dated 1974.

ASTM-A446 Steel Sheet, Zinc-Coated by Hot-Dip Process, Physical Quality, dated 1972

(Continued)

(3) **Steel Structures Painting Council (SSPC)**
SSPC-SP-3 Power Tool Cleaning

(4) **Federal Specification**
TT-P-636d Primer Coating, Alkyd, Wood and Ferrous Metal.
TT-V-5le Varnish, Asphalt.
TT-P-645 Primer, Paint Zinc Chromate, Alkyd Type

(5) **Military Specification**
MIL-C-18480A Coating Compound, Bituminous Solvent, Coal Tar Base.

(6) **American Welding Society (AWS)**

Whenever a difference exists between the design drawings and this specification, the drawing shall govern.

3.0 **MATERIALS**

**Structural Steel, Structural Tubing, and Steel Pipe**

3.1.1 Structural steel, structural tubing, and steel pipe shall conform to the following ASTM Specifications:

(1) Structural Steel: ASTM A36

(2) Structural Tubing: ASTM A501

(3) Steel Pipe: ASTM A53, Type E or S, Grade B

3.1.2 Welding electrodes with a minimum tensile strength of 70 ksi shall be used. Electrodes shall be compatible with welding process selected, conforming to Fluor Specification SP-453504-90-13.
3.2 Bolts

3.2.1 Common (machine) bolts shall be 5/8 inch diameter and shall conform to ASTM A307 specifications. Nuts shall be American National Standard, hexagonal heavy.

3.2.2 High-strength bolts shall be 3/4 inch diameter unless otherwise noted, and shall conform to ASTM Specification A325. One high-strength bolt assembly shall consist of a heavy semifinished hex head structural bolt and a heavy semifinished hex nut.

3.2.3 All bolts required for erection shall be included with the first shipment of fabricated steel for each unit or structure in clearly marked containers.

3.2.4 Quantities of both common and high-strength bolts shall include 5 percent extra per size and length, to cover requirements for fit-up and erection.

3.2.5 Nelson welded threaded stud bolts shall be of size as noted on the drawings.

3.2.6 Nelson welded studs are an acceptable substitute for the welded mild steel concrete anchors indicated on the drawings.

3.2.7 All bolt threads shall extend a minimum of three (3) thread lengths beyond the outer nut surface after bolts have been tightened.

4.0 DETAILS AND FABRICATION

4.1 Contractor shall conform to the following shop detailing and fabricating requirements unless shown otherwise on the design drawings.

4.1.1 Connections which are not detailed or otherwise noted on the design drawings shall be shop-welded and field-bolted according to the AISC Manual of Steel Construction, Framed Beam Connections, Tables III and I. Use the maximum number of rows of field bolts shown in Table I for each beam depth. Use a 1/4 inch shop weld "A" shown in Table III for the required number of field bolts. Shop connections having unprimed contact surfaces shall be seal welded to prevent corrosion except when physically impossible.

4.1.2 Field connections shall be made using high strength bolts in bearing connections unless noted otherwise on the design
4.1.2 (Continued)

drawings. Do not omit paint or galvanizing from the contact surfaces within the joints. Bolt threads need not be excluded from the shear planes.

4.1.3 End distances shall conform to AISC, "Structural Steel for Buildings", Section 1.16.6, without reduction for low stress unless noted on the design drawings. When more than two fasteners are provided in the line of stress, the provisions of Section 1.16.5 of AISC, "Structural Steel for Buildings", shall govern.

4.1.4 The Fabricating Contractor shall furnish and install erection clips for fit-up of welded connections.

Clearance shall be provided for field erection in accordance with AISC Manual of Steel Construction, Part 4, pages 114 and 115.

Gusset plates shall be 5/16 inch thick minimum.

4.1.7 Columns shall have full bearing at splices and at end plates.

4.1.8 Sharp corners and burrs shall be removed before shop priming.

4.1.9 Structural steel welding shall be in accordance with requirements outlined in Fluor Specification SP-453504-90-13.

4.1.10 Double angle members when used, shall have welded fillers spaced in accordance with Section 1.18.2.4 of the AISC, "Structural Steel for Buildings."

4.1.11 Shop Painting

4.1.11.1 Steel items shown on the drawings and/or specified herein this division of the specification (except stainless steel items and steel decking) shall be given a shop coat of Alkyd Zinc Chromate Primer, conforming with Federal Specification TT-P-645.

4.1.11.2 Cleaning and shop priming shall be in accordance with Section 1.24 entitled "Shop Painting" of A.I.S.C. Specification for the Design, Fabrication and Erection of Structural Steel for Building, and in accordance with the Steel Structures Painting Council (SSPC) Specification SSPC-SP-3 Power Tool Cleaning.
4.1.11.3 Steel work specified to have no shop painting shall be cleaned of loose mill scale or rust by wire brushing or other methods elected by the fabricator.

4.1.11.4 Faulty applied primer shall be removed and reprimed after proper surface preparation.

4.1.11.5 After erection, structural steel field connections and abraded surfaces shall be touched up with the same paint used for shop painting. See Architectural Specification SP-453504-30-1 entitled "Painting and Protective Coating."

4.1.11.6 Steel embedded in concrete or masonry shall not be painted but shall be clean and free of rust, oil, and dirt.

4.1.12 Finish Painting

For finish painting see Architectural Specification SP-453504-30-1 entitled "Painting and Protective Coating."

4.2 Shop Drawings

4.2.1 The Fabricating Contractor shall submit a transparency of shop drawings, bills of material, including field bolt lists, and erection drawings to the Contracting Officer for approval before starting fabrication. Only checked drawings will be accepted for approval. Approval of shop drawings by the Contracting Officer shall be interpreted as approval of general methods and arrangements only, and shall not constitute verification of dimensions or quantities. The Fabricating Contractor shall be responsible for the accuracy of fabrication and erection fit-up.

4.2.2 Shop drawings shall include all structural steel, steel decking, grating and all miscellaneous metal covered by this specification.

5.0 INSTALLATION OF HIGH STRENGTH BOLTS

5.1 High Strength bolts shall be tightened by the turn-of-nut method.

Tightening may also be accomplished by turning the bolt head while holding the nut if required by clearances.
Washers are not required, except for tapered washers used to bolt to the flanges of American Standard I beams or channels.

Prior to tightening any bolts, there shall first be enough bolts brought to a snug-tight condition to insure that the joint surfaces are in good contact. Snug-tight is defined as the tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.

Following this initial operation, bolts shall be placed in any remaining holes in the connection and brought to snug-tightness.

5.6 Bolts shall then be tensioned by the applicable amount of nut rotation given in the table below. The tensioning shall progress systematically from the most rigid part of the joint to its free edges. During this operation there shall be no rotation of the part not turned by the wrench.

**NUT ROTATION FROM SNUG-TIGHT CONDITION**

<table>
<thead>
<tr>
<th>Disposition of Outer Faces of Bolted Parts</th>
<th>Disposition of Outer Faces of Bolted Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both faces normal to bolt axis, or one face normal to axis and other face sloped not more than 1:20 (bevel washers not used)</td>
<td>Both faces sloped not more than 1:20 from normal to bolt axis (bevel washers not used)</td>
</tr>
<tr>
<td>Bolt length not exceeding 8 inches or 8 inches</td>
<td>Bolt length exceeding 8 inches or 8 inches</td>
</tr>
<tr>
<td>1/2 turn</td>
<td>2/3 turn</td>
</tr>
<tr>
<td>3/4 turn</td>
<td>For all length of bolts</td>
</tr>
</tbody>
</table>

Nut rotation is rotation relative to bolt regardless of the element (nut or bolt) being turned.

Tolerance on rotation: 30 degrees over or under. For course thread heavy hex structural bolts of all sizes and length and heavy hex semifinished nuts.

Bolt length is measured from underside of head to extreme point of point.
The sides of either bolt heads or nuts tightened with an impact wrench will appear slightly peened, and thus indicate that the wrench has been applied to the fastener. It will not be necessary to use other means to assure satisfactory installation.

6.0 STEEL DECKING

General

6.1.1 Physical properties of the steel decking (gage, moment of inertia and section modulus) shall not be less than that specified on the drawings. The depth of steel decking shall be as indicated on the drawings. End and side closures and other required accessories shall be provided.

6.1.2 Deck material and design shall conform to the "Basic Design Specification" as adopted by Steel Deck Institute.

6.1.3 See the drawings for the type of deck to be used, and welding instructions.

6.1.4 Where the steel decking is used as bonded unit with concrete floor, deformations shall be provided in all vertical webs of the steel decking to structurally bond the overlying structural concrete fill.

6.1.5 The following items shall be included but not limited to the same: Provide ridge and valley plates, welding, and other required fasteners and accessories. Where so indicated on the drawing, provide galvanized sheet metal closures at the top of the metal stud partitions and the underside of the steel decking.

Materials

6.2.1 The steel floor units and all flashings shall be formed from steel sheets conforming to ASTM-A446-72 with a minimum yield strength of 33,000 psi. The steel shall have a metal protective coating of zinc, conforming to ASTM-A525-73 with minimum weight of coating designation G60 light commercial.

Installation

6.3.1 Installation shall be in strict accordance with the engineering drawings and the manufacturer's erection drawings.
6.3.2 Verify alignment and level of structural steel work, and advise the Contracting Officer of inaccuracies or improper conditions so corrections can be made before decking work has commenced.

6.3.3 Six-inch and smaller openings, measured at right angles to the deck span, shall be cut in the field.

6.3.4 Openings over six inches and up to 30 inches in width shall be cut in the field and reinforced as shown on the drawings.

6.3.5 Openings larger than 30 inches in width shall be supported on structural steel, with deck openings cut in the shop.

6.3.6 Installation and welding of side and end closures shall be in accordance with the manufacturer’s recommendations.

6.3.7 Where the steel decking is used as bonded unit with concrete floor, the finished deck shall be so constructed and erected as to prevent the flow of concrete through the joints.

6.3.8 After erection, galvanized surface damaged with scratches, welds, cuts or threads, shall be touched-up with cold galvanizing coating. Surfaces shall be cleaned of grease, oil or paint. Weld scale or rust shall be cleaned by wire brushing, or sandblasted. Surface preparation and application shall be in accordance with the recommendations of the compound manufacturer.

6.3.9 Decking shall be fastened to the supporting steel framework as indicated on the drawings. E60 electrodes shall be used on metal decking. E60 electrodes shall conform to American Welding Society (AWS) A5.1 specification for Mild Steel Covered Arc-Welding Electrodes.

7.0 METAL GRATING AND TREADS

7.1 Grating Type

Grating shall be serrated welded with 1-1/4" X 3/16" bearing bars at 1-3/16 inch centers and crossbars at 4 inch centers unless called otherwise on the drawings. Grating shall be shop coated and painted in accordance with Section 4.1.11.
7.2 Stair Treads

Stair treads shall be metal grating with perforated or checker plate standard nosings. The treads shall be fabricated from serrated welded grating having 1" x 1/8" bearing bars at 1-3/16 inch centers.

A standard nosing shall be provided on the grating at the head of stairs.

Banding

Banding bars shall be of the same thickness as the bearing bars to which they are welded. The following locations shall be trim banded, except 7.3.4 which shall be load-carrying banded.

7.3.1 Open ends of grating at head of ladder approach to platform.
7.3.2 Dimensioned openings in grating.
7.3.3 Grating panels with four (4) or less crossbars.
7.3.4 Cutouts having unsupported bearing bars.

7.4 Openings

Openings dimensioned on the design drawings shall be provided by the Fabricating Contractor. Undimensioned openings shall be cut in the field.

Fasteners

7.5.1 Grating shall be removable unless otherwise specified on the drawings.
7.5.2 Grating fasteners shall be saddle clip anchors secured to the supporting steel by gun-welded studs. Two fasteners per panel shall be used at each support with a minimum of four per panel.

8.0 MISCELLANEOUS METAL

Ferrous and nonferrous metal items, shapes and work not specified in other divisions, include, but are not limited to, the following:

8.1.1 Miscellaneous angles, brackets, bracing, bolts, fastenings, and expansion anchor bolts and grouted plates.
8.1.2 Embedded: Anchor bolts for equipment and machinery, sleeves and other embedded items.

8.1.3 Supports and backing plates (fastened to metal studs, steel framing, etc.) for: toilet compartment partitions (channel supports), urinal screens, plumbing fixtures, toilet room accessories, mirrors, wall hooks, cabinets, clocks, alarms, fire extinguishers, bulletin boards, equipment and other wall mounted items.

Miscellaneous steel items (except galvanized items) shall be given a shop coat primer complying with Section 4.1.11, unless otherwise noted on drawings.

After erection damaged galvanized surface from scratches, welds, cuts or threads, shall be touched up with cold galvanizing coating. Surfaces shall be cleaned of grease, oil or paint. Weld scale (Slag) or rust shall be cleaned by wire brushing. Surface preparation and application shall be in accordance with the recommendations of the compound manufacturer.

9.0 STAINLESS STEEL

For stainless steel requirements see Specification SP-453504-20-2, "Stainless Steel."

10.0 DISSIMILAR MATERIALS

10.1 Where dissimilar metal surfaces come in contact with metals other than stainless steel, or zinc, isolate the contact surfaces from direct contact with each other to prevent electrolytic corrosive action. One of the following methods shall be used for isolation:

10.1.1 Dissimilar metals at contact surfaces shall be painted with prime coat of zinc-chromate primer, and two coats of protective coating paint (other than paint with lead pigment) which conforms to Federal Specification TT-V-51e (Varnish, Asphalt) or Military Specification MIL-C-18480A (Coating Compound, Bituminous Solvent, Coal Tar Base).

10.1.2 Dissimilar metals shall be painted with heavy coat alkali-resistant bituminous paint in concealed areas.

10.1.3 Dissimilar metals surfaces shall be separated by nonabsorptive tape or gasket.
Fasteners between dissimilar metals shall be hot dipped galvanized, zinc plated, or stainless steel.

11.0 PREFORMED METAL SIDING

For preformed metal siding see Architectural Specification SP-453504-30-7 entitled "Preforemed Metal Siding."

12.0 SUBSTITUTIONS

Proposals, in writing, for substitution of steel members in place of those specified, may be submitted for consideration only in the event specified members are not available. No substitutions of member sizes or changes in details or dimensions shall be permitted without the written approval of the Contracting Officer.

The Contracting Officer reserves the right to reject any unsatisfactory materials and misfit members resulting from errors in shop detailing or fabrication, or to make corrections on the job.

13.0 INSPECTION

13.1 The inspectors representing the Contracting Officer shall have access entry at all times to the fabricator's plants for shop inspection and to the construction site where work is being performed.

All welding inspection and examination shall be in accordance with Fluor Specification SP-453504-90-13.

13.3 Twenty percent radiographic examination is required for the full penetration welds in maintenance area superstructure and Decon Area superstructure as shown on the design drawings. The location of such examination will be determined by the contracting officer's inspectors. Ultrasonic examination can be used as a substitution for the radiographic examination.
HWMA/RCRA PART B PERMIT
FOR THE IDAHO NATIONAL LABORATORY

Volume 18 – Idaho Nuclear Technology and Engineering Center

APPENDIX 5

Debris Treatment Processes
Holdup and Collection Tanks
CPP-659/-1659 Storage
CPP-666 FDP Cell Container Storage and Slab Tank Storage
Other Miscellaneous Treatment Processes
RMWSF (CPP-1617) Container Storage Area

PHYSICAL PROPERTIES AND CHEMICAL RESISTANCE
FOR SERIES 300 STAINLESS STEEL

Effective Date: April 27, 2009
<table>
<thead>
<tr>
<th>Material</th>
<th>Acid solutions, e.g., hydrochloric acid, phosphoric acid, nitric acid, many halogen compounds, many organics</th>
<th>Neutral solutions, e.g., water</th>
<th>Alkaline solutions, e.g., ammonia</th>
<th>Oxidizing media</th>
<th>Neutral or alkaline solutions, e.g., persulfates, permanganates, chromates</th>
<th>Pitting media, acid ferrous chromates solutions</th>
<th>Fresh-water suspension</th>
<th>Seawater</th>
<th>Steam</th>
<th>Frequent gus with minimal sulfur content</th>
<th>Reducing, e.g., hematite ore suspensions</th>
<th>Pickling, e.g., brine, sulfuric acid</th>
<th>Ambient, non-gaseous industrial media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost iron, steel, grey iron, cast iron, brass, bronze, copper, aluminum alloy</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Ductile iron, high-strength cast iron, brass, bronze, copper, aluminum alloy</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Molybdenum steel, stainless steel, iron, austenitic 18</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Nickel-chrome steel, austenitic 18</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Stainless steel, austenitic 18</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Molybdenum steel, martensitic 18/8</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>21</td>
<td>23</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>Stainless steel, martensitic 18/8</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>21</td>
<td>23</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>Molybdenum steel, martensitic 18/8, 17/11, 17/8</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Stainless steel, martensitic 18/8, 17/11, 17/8</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Ferritic stainless steel, martensitic 18/8</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>21</td>
<td>23</td>
<td>25</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td>Stainless steel, martensitic 18/8, 17/11, 17/8, 17/11, 17/8</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>21</td>
<td>23</td>
<td>25</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td>Nickel-chrome steel, austenitic 18/8, 17/11, 17/8, 17/8</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>Stainless steel, martensitic 18/8, 17/11, 17/8, 17/8, 17/8</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>28</td>
<td>30</td>
</tr>
</tbody>
</table>

**Note:** This table provides information on the corrosion properties of various metals and alloys in different media conditions. The table includes ratings for various corrosive environments and provides guidance on the suitability of materials for different applications.
<table>
<thead>
<tr>
<th>Material</th>
<th>Max. e.g. Charpy below</th>
<th>Charpy above</th>
<th>Hydrogen insol., etc.</th>
<th>Available form</th>
<th>Hardness</th>
<th>Maximum strength, annealed 1000 ksi (resp.)</th>
<th>Coefficient of thermal expansion, thousand per °F</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast iron, malleable iron or low alloy</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>&lt; 400</td>
<td>Cast</td>
<td>No</td>
<td>Fair</td>
<td>43</td>
</tr>
<tr>
<td>Leaded iron (higher strength and hardness may be obtained by quenching and oil treatment or heat)</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>&lt; 400</td>
<td>Cast</td>
<td>No</td>
<td>Good</td>
<td>41</td>
</tr>
<tr>
<td>Ni-Resist corrosion-resistant cast iron</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>&lt; 400</td>
<td>Cast</td>
<td>No</td>
<td>No</td>
<td>27</td>
</tr>
<tr>
<td>Duriron-14% silicon iron</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>&lt; 400</td>
<td>Wrought, cast</td>
<td>Good</td>
<td>Good</td>
<td>78</td>
</tr>
<tr>
<td>Build-up, semi-bolster iron and steel</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>&lt; 400</td>
<td>Wrought, cast</td>
<td>Good</td>
<td>Good</td>
<td>90</td>
</tr>
<tr>
<td>Stainless steel, cast iron 17% Cr type</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>&lt; 400</td>
<td>Wrought, cast</td>
<td>Good</td>
<td>Good</td>
<td>90</td>
</tr>
<tr>
<td>Stainless steel, austenitic 18 Cr, 8 Ni type</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>&lt; 400</td>
<td>Wrought, cast</td>
<td>Good</td>
<td>Good</td>
<td>90</td>
</tr>
<tr>
<td>Stainless steel, austenitic 18 Cr 25 Mn 2.5 Mo type</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>&lt; 400</td>
<td>Wrought, cast</td>
<td>Good</td>
<td>Good</td>
<td>90</td>
</tr>
<tr>
<td>Stainless steel, martensitic 30 Cr 20 Ni 5.5 Mo 3.5 Cr type</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>&lt; 400</td>
<td>Wrought, cast</td>
<td>Good</td>
<td>Good</td>
<td>90</td>
</tr>
<tr>
<td>Incoloy 802 nickel-chromium-alloy 1.5 Mo 2.5 Cr 5 Mo 1.3 Cr, lad. Fe</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>&lt; 400</td>
<td>Wrought, cast</td>
<td>Good</td>
<td>Good</td>
<td>100</td>
</tr>
<tr>
<td>Stainless alloys C-STR (53 Ni 17 Mo 16 Cr 6 Fe 4 Fe) &amp; WP</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>&lt; 720</td>
<td>Wrought, cast</td>
<td>Fair</td>
<td>Good</td>
<td>145</td>
</tr>
<tr>
<td>Incoloy alloy B-3 Fe (61 Ni 23 Mo 6 Fe 9 Fe)</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>&lt; 750</td>
<td>Wrought, cast</td>
<td>Fair</td>
<td>Good</td>
<td>155</td>
</tr>
<tr>
<td>Stainless alloys C-STR (38 Ni 17 Mo 16 Cr 6 Fe 4 Fe)</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>&lt; 750</td>
<td>Wrought, cast</td>
<td>Fair</td>
<td>Good</td>
<td>150</td>
</tr>
</tbody>
</table>

Very brittle, susceptible to cracking by mechanical and thermal stress. High strength and toughness obtained by annealing, also by material extraneous corrosion-resistant. See ASTM specifications for particular grade. ASTM type 423 (4.9) ASTM corrosion- and heat-resistant steel. ASTM corrosion- and heat-resistant steel, hardened at LC type very low welding. ASTM type 215 (4.9) ASTM corrosion- and heat-resistant steel, hardened at LC type very low welding. ACI 305-56, good resistance to mild corrosive, phosphoric and (very) mild acids at elevated temperatures. Special alloy with good resistance to mild corrosive, phosphoric and (very) mild acids at elevated temperatures. Very high corrosion to very chloric EDC and sodium hypochlorite solutions. Resistant to solutions of hydrochloric and sulfuric acids. Widely applicable in food and pharmaceutical industries.
### TABLE 23-5 Coefficient of Thermal Expansion of Common Alloys

<table>
<thead>
<tr>
<th>UNS</th>
<th>Material</th>
<th>Value 10^-6 (in./in.°F)</th>
<th>Temperature Range °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A81100</td>
<td>Aluminum alloy</td>
<td>13.1</td>
<td>20-100</td>
</tr>
<tr>
<td>A85082</td>
<td>Aluminum alloy</td>
<td>13.2</td>
<td>20-100</td>
</tr>
<tr>
<td>63</td>
<td>Aluminum cast alloy</td>
<td>12.5</td>
<td>20-100</td>
</tr>
<tr>
<td>C1000</td>
<td>Copper</td>
<td>9.4</td>
<td>20-100</td>
</tr>
<tr>
<td>C2000</td>
<td>Red brass</td>
<td>10.4</td>
<td>20-100</td>
</tr>
<tr>
<td>C3400</td>
<td>Admiralty brass</td>
<td>11.2</td>
<td>20-100</td>
</tr>
<tr>
<td>C3600</td>
<td>Muntz metal</td>
<td>11.6</td>
<td>20-100</td>
</tr>
<tr>
<td>C31400</td>
<td>Aluminum bronze D</td>
<td>9.0</td>
<td>20-100</td>
</tr>
<tr>
<td>C2400</td>
<td>Bronze</td>
<td>10.2</td>
<td>0-100</td>
</tr>
<tr>
<td>C2100</td>
<td>90-10 copper nickel</td>
<td>9.3</td>
<td>20-500</td>
</tr>
<tr>
<td>C21500</td>
<td>70-25 copper nickel</td>
<td>9.0</td>
<td>20-500</td>
</tr>
<tr>
<td>G10200</td>
<td>Carbon steel, AISI 1020</td>
<td>6.7</td>
<td>0-200</td>
</tr>
<tr>
<td>F10005</td>
<td>Gray cast iron, 4-4 Cr, Ni 400 steel</td>
<td>6.7</td>
<td>0-200</td>
</tr>
<tr>
<td>S50100</td>
<td>Stainless steel, AISI 410</td>
<td>6.1</td>
<td>20-500</td>
</tr>
<tr>
<td>S44000</td>
<td>Stainless steel, AISI 440</td>
<td>5.8</td>
<td>20-500</td>
</tr>
<tr>
<td>S45400</td>
<td>Stainless steel, AISI 304</td>
<td>9.8</td>
<td>20-500</td>
</tr>
<tr>
<td>S31000</td>
<td>Stainless steel, AISI 310</td>
<td>8.0</td>
<td>20-500</td>
</tr>
<tr>
<td>J92214</td>
<td>Stainless steel, AlSi HX</td>
<td>9.4</td>
<td>20-500</td>
</tr>
<tr>
<td>N54000</td>
<td>Nickel alloy 500</td>
<td>7.4</td>
<td>20-90</td>
</tr>
<tr>
<td>N54400</td>
<td>Nickel alloy 400</td>
<td>7.7</td>
<td>20-90</td>
</tr>
<tr>
<td>N06600</td>
<td>Nickel alloy 600</td>
<td>7.4</td>
<td>20-90</td>
</tr>
<tr>
<td>N10663</td>
<td>Nickel-molybdenum alloy B-2</td>
<td>8.6</td>
<td>20-90</td>
</tr>
<tr>
<td>N10676</td>
<td>Nickel-molybdenum alloy G-276</td>
<td>8.3</td>
<td>20-90</td>
</tr>
<tr>
<td>B50250</td>
<td>Titanium, commercially pure</td>
<td>4.8</td>
<td>0-100</td>
</tr>
<tr>
<td>B56400</td>
<td>Titanium alloy Ti-6Al-4V</td>
<td>4.9</td>
<td>0-100</td>
</tr>
<tr>
<td>M11311</td>
<td>Magnesium alloy AZ31B</td>
<td>14.5</td>
<td>20-100</td>
</tr>
<tr>
<td>M1131C</td>
<td>Magnesium alloy AZ91C</td>
<td>14.5</td>
<td>20-100</td>
</tr>
<tr>
<td>L03000</td>
<td>Chemical cast iron</td>
<td>13.1</td>
<td>0-100</td>
</tr>
<tr>
<td>M13002</td>
<td>Zircaloy 2</td>
<td>12.5</td>
<td>0-100</td>
</tr>
<tr>
<td>R60722</td>
<td>Molybdenum</td>
<td>2.9</td>
<td>0-100</td>
</tr>
<tr>
<td>R02080</td>
<td>Titanium</td>
<td>3.5</td>
<td>20-100</td>
</tr>
</tbody>
</table>

### TABLE 23-6 Melting Temperatures of Common Alloys

<table>
<thead>
<tr>
<th>UNS</th>
<th>Material</th>
<th>Melting Range °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A81100</td>
<td>Aluminum alloy</td>
<td>1120-1210</td>
</tr>
<tr>
<td>A85082</td>
<td>Aluminum alloy</td>
<td>1125-1250</td>
</tr>
<tr>
<td>A54400</td>
<td>Aluminum cast alloy</td>
<td>1085-1170</td>
</tr>
<tr>
<td>C1000</td>
<td>Copper</td>
<td>1890</td>
</tr>
<tr>
<td>C2000</td>
<td>Red brass</td>
<td>1810-1850</td>
</tr>
<tr>
<td>C3400</td>
<td>Admiralty brass</td>
<td>1650-1720</td>
</tr>
<tr>
<td>C3600</td>
<td>Muntz metal</td>
<td>1530-1600</td>
</tr>
<tr>
<td>C31400</td>
<td>Aluminum bronze D</td>
<td>1910-1940</td>
</tr>
<tr>
<td>C2400</td>
<td>Bronze</td>
<td>1010-1140</td>
</tr>
<tr>
<td>C2100</td>
<td>90-10 copper nickel</td>
<td>2010-2100</td>
</tr>
<tr>
<td>C21500</td>
<td>70-25 copper nickel</td>
<td>2140-2250</td>
</tr>
<tr>
<td>G10200</td>
<td>Carbon steel, AISI 1020</td>
<td>2750</td>
</tr>
<tr>
<td>F10005</td>
<td>Gray cast iron, 4-4 Cr, Ni 400 steel</td>
<td>3200</td>
</tr>
<tr>
<td>S50100</td>
<td>Stainless steel, AISI 410</td>
<td>2700-2790</td>
</tr>
<tr>
<td>S44000</td>
<td>Stainless steel, AISI 440</td>
<td>2500-2720</td>
</tr>
<tr>
<td>S45400</td>
<td>Stainless steel, AISI 304</td>
<td>2550-2650</td>
</tr>
<tr>
<td>S31000</td>
<td>Stainless steel, AISI 310</td>
<td>2500-2550</td>
</tr>
<tr>
<td>J92214</td>
<td>Stainless steel, AlSi HX</td>
<td>2550</td>
</tr>
<tr>
<td>N54000</td>
<td>Nickel alloy 500</td>
<td>2615-2653</td>
</tr>
<tr>
<td>N54400</td>
<td>Nickel alloy 400</td>
<td>2670-2740</td>
</tr>
<tr>
<td>N06600</td>
<td>Nickel alloy 600</td>
<td>2400-2573</td>
</tr>
<tr>
<td>N10663</td>
<td>Nickel-molybdenum alloy B-2</td>
<td>2275-2495</td>
</tr>
<tr>
<td>N10676</td>
<td>Nickel-molybdenum alloy G-276</td>
<td>2420-2520</td>
</tr>
<tr>
<td>B50250</td>
<td>Titanium, commercially pure</td>
<td>2500</td>
</tr>
<tr>
<td>B56400</td>
<td>Titanium alloy Ti-6Al-4V</td>
<td>2620-2720</td>
</tr>
<tr>
<td>M11311</td>
<td>Magnesium alloy AZ31B</td>
<td>1120-1170</td>
</tr>
<tr>
<td>M1131C</td>
<td>Magnesium alloy AZ91C</td>
<td>1085-1170</td>
</tr>
<tr>
<td>L03000</td>
<td>Chemical cast iron</td>
<td>415</td>
</tr>
<tr>
<td>M13002</td>
<td>Zircaloy 2</td>
<td>1830-1920</td>
</tr>
<tr>
<td>R60722</td>
<td>Molybdenum</td>
<td>2520</td>
</tr>
<tr>
<td>R02080</td>
<td>Titanium</td>
<td>2510</td>
</tr>
</tbody>
</table>

*Courtesy of National Association of Corrosion Engineers*
### TABLE 23-12 Standard Wrought Austenitic Stainless Steels*

<table>
<thead>
<tr>
<th>AISI type</th>
<th>UNS</th>
<th>Composition, %</th>
<th>Yield strength, ksi/20°F</th>
<th>Tensile strength, ksi/20°F</th>
<th>Elasticity, %</th>
<th>Hardness, HB</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>S20100</td>
<td>26-18</td>
<td>0.05 0.15 1.0 2.5-7.0</td>
<td>0.25 N 55 (379) 115 (762)</td>
<td>55</td>
<td>155</td>
</tr>
<tr>
<td>202</td>
<td>S20200</td>
<td>17-19</td>
<td>0.15 0.15 1.0 7.5-10</td>
<td>0.25 N 55 (379) 105 (724)</td>
<td>55</td>
<td>185</td>
</tr>
<tr>
<td>301</td>
<td>S30100</td>
<td>16-18</td>
<td>0.05 0.15 1.0 2.0</td>
<td>40 (276) 93 (651)</td>
<td>55</td>
<td>185</td>
</tr>
<tr>
<td>302</td>
<td>S30200</td>
<td>17-19</td>
<td>0.05 0.15 1.0 2.0</td>
<td>55 (354) 90 (631)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>303</td>
<td>S30300</td>
<td>17-19</td>
<td>0.15 1.0 2.0-3.0</td>
<td>40 (276) 90 (631)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>303Se</td>
<td>S30335</td>
<td>17-19</td>
<td>0.15 1.0 2.0</td>
<td>0.15 % 0.15 % 2 P 40 (276) 90 (631)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>304</td>
<td>S30400</td>
<td>18-30</td>
<td>0.05 1.0 2.0-3.0</td>
<td>35 (241) 90 (631)</td>
<td>50</td>
<td>149</td>
</tr>
<tr>
<td>304L</td>
<td>S30403</td>
<td>18-20</td>
<td>0.05 1.0 2.0</td>
<td>35 (241) 79 (543)</td>
<td>50</td>
<td>143</td>
</tr>
<tr>
<td>304N</td>
<td>S30435</td>
<td>18-20</td>
<td>0.05 1.0 2.0</td>
<td>48 (314) 90 (631)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>304LMod</td>
<td>S30409</td>
<td>18-30</td>
<td>0.05 1.0 2.0</td>
<td>48 (314) 90 (631)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>305</td>
<td>S30500</td>
<td>18-25</td>
<td>0.05 1.0 2.0</td>
<td>30 (227) 65 (454)</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>309</td>
<td>S30900</td>
<td>18-24</td>
<td>0.05 1.0 2.0</td>
<td>40 (276) 90 (631)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>309S</td>
<td>S30908</td>
<td>20-24</td>
<td>0.05 1.0 2.0</td>
<td>40 (276) 90 (631)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>310</td>
<td>S31000</td>
<td>22-25</td>
<td>0.05 1.0 2.0</td>
<td>45 (310) 95 (655)</td>
<td>50</td>
<td>170</td>
</tr>
<tr>
<td>310S</td>
<td>S31008</td>
<td>20-25</td>
<td>0.05 1.0 2.0</td>
<td>45 (310) 95 (655)</td>
<td>50</td>
<td>170</td>
</tr>
<tr>
<td>316</td>
<td>S31600</td>
<td>24-26</td>
<td>0.05 1.0 2.0</td>
<td>50 (365) 100 (687)</td>
<td>50</td>
<td>160</td>
</tr>
<tr>
<td>316L</td>
<td>S31603</td>
<td>24-26</td>
<td>0.05 1.0 2.0</td>
<td>54 (365) 100 (687)</td>
<td>50</td>
<td>160</td>
</tr>
<tr>
<td>316H</td>
<td>S31633</td>
<td>16-18</td>
<td>0.10 0.25 1.0 2.0</td>
<td>40 (276) 90 (631)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>317</td>
<td>S31700</td>
<td>18-20</td>
<td>0.10 0.25 1.0 2.0</td>
<td>50 (365) 100 (687)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>317L</td>
<td>S31733</td>
<td>18-20</td>
<td>0.10 0.25 1.0 2.0</td>
<td>53 (394) 105 (712)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>321</td>
<td>S32100</td>
<td>17-19</td>
<td>0.10 0.25 1.0 2.0</td>
<td>30 (227) 65 (454)</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>325</td>
<td>S32500</td>
<td>25-30</td>
<td>0.10 0.25 1.0 2.0</td>
<td>60 (433) 105 (712)</td>
<td>50</td>
<td>210</td>
</tr>
<tr>
<td>347</td>
<td>S34700</td>
<td>19-25</td>
<td>0.10 0.25 1.0 2.0</td>
<td>35 (241) 90 (631)</td>
<td>50</td>
<td>180</td>
</tr>
<tr>
<td>348</td>
<td>S34800</td>
<td>17-19</td>
<td>0.10 0.25 1.0 2.0</td>
<td>35 (241) 90 (631)</td>
<td>50</td>
<td>180</td>
</tr>
</tbody>
</table>

*Courtesy of National Association of Corrosion Engineers. To convert megapascals to pounds-force per square inch, multiply by 145.04.

1 Single values are maximum values unless otherwise noted.
2 Typical room-temperature properties for solutions-annealed material unless otherwise noted.
3 Minimum.
4 Maximum except T = 0.1 maximum.

### TABLE 23-13 Standard Cast Corrosion-Resistant Stainless Steels*

<table>
<thead>
<tr>
<th>ACI</th>
<th>Equivalents</th>
<th>UNS</th>
<th>Composition, %</th>
<th>Yield strength, ksi/20°F</th>
<th>Tensile strength, ksi/20°F</th>
<th>Elasticity, %</th>
<th>Hardness, HB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ca-15</td>
<td>410</td>
<td>19150</td>
<td>11.5-14</td>
<td>1.0 0.5 0.15 1.0 1.0 1.50</td>
<td>150 (1054) 200 (1379) 77 390°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ca-15M</td>
<td>410</td>
<td>19151</td>
<td>11.5-14</td>
<td>1.0 0.15-0.20 0.15 1.0 1.50</td>
<td>150 (1054) 200 (1379) 77 390°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ca-4</td>
<td>420</td>
<td>19154</td>
<td>11.5-14</td>
<td>3.5-4.8 0.4-1.0 0.08 1.0 1.00</td>
<td>100 (689) 130 (882) 4 290°F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ca-40</td>
<td>420</td>
<td>19153</td>
<td>11.5-14</td>
<td>1.0 0.3 0.20-0.40 1.0 1.50</td>
<td>155 (1103) 220 (1517) 14 670°F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CB-30</td>
<td>431</td>
<td>19203</td>
<td>18-21</td>
<td>2.0</td>
<td>0.5 1.0 2.0 2.0 1.50</td>
<td>60 (414) 95 (655) 15 190°F</td>
<td></td>
</tr>
<tr>
<td>CB-50</td>
<td>448</td>
<td>19213</td>
<td>25-30</td>
<td>4.0</td>
<td>2.0 1.0 2.0 2.0 1.50</td>
<td>65 (448) 95 (655) 15 190°F</td>
<td></td>
</tr>
<tr>
<td>CE-50</td>
<td>312</td>
<td>19245</td>
<td>25-30</td>
<td>8.11</td>
<td>0.5 2.0 2.0 3.0 2.0 1.50</td>
<td>65 (448) 95 (655) 15 190°F</td>
<td></td>
</tr>
<tr>
<td>CB-7Co</td>
<td>17-4PH</td>
<td>312</td>
<td>19245</td>
<td>25-30</td>
<td>8.11</td>
<td>0.5 2.0 2.0 3.0 2.0 1.50</td>
<td>65 (448) 95 (655) 15 190°F</td>
</tr>
<tr>
<td>CD-44Mo</td>
<td>17-4PH</td>
<td>312</td>
<td>19245</td>
<td>25-30</td>
<td>8.11</td>
<td>0.5 2.0 2.0 3.0 2.0 1.50</td>
<td>65 (448) 95 (655) 15 190°F</td>
</tr>
</tbody>
</table>

*Courtesy of National Association of Corrosion Engineers. To convert megapascals to pounds-force per square inch, multiply by 145.04.

1 Single values are maximum values unless those in parentheses are maximum values. P and S values are 0.04 maximum.
2 Typical room-temperature properties for solutions-annealed material unless otherwise noted.
3 For material air-cooled from 1500°F and tempered at 600°F.
4 For material air-cooled from 1500°F and tempered at 1100°F.
5 For material annealed at 1450°F, furnace-cooled to 1000°F, then air-cooled.
6 Air-cooled from 1900°F.
7 0.5 maximum.
<table>
<thead>
<tr>
<th>Corrosion mediums</th>
<th>Test conditions</th>
<th>Average corrosion rates (ipy)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INDUSTRY (PROCESS)</td>
<td>TYPE OF TEST</td>
</tr>
<tr>
<td>50%</td>
<td>Research</td>
<td>L 98</td>
</tr>
<tr>
<td>42%</td>
<td>Research</td>
<td>L 200</td>
</tr>
<tr>
<td>40%</td>
<td>Research</td>
<td>L 98</td>
</tr>
<tr>
<td>30%</td>
<td>Research</td>
<td>L 98</td>
</tr>
<tr>
<td>25%</td>
<td>Research</td>
<td>L 130</td>
</tr>
<tr>
<td>20%</td>
<td>Research</td>
<td>L 98</td>
</tr>
<tr>
<td>10%</td>
<td>Research</td>
<td>L 98</td>
</tr>
<tr>
<td>10%</td>
<td>Research</td>
<td>L 212</td>
</tr>
<tr>
<td>10%</td>
<td>Chemical</td>
<td>L B.P.</td>
</tr>
<tr>
<td>10%</td>
<td>Research</td>
<td>L 75</td>
</tr>
<tr>
<td>10%</td>
<td>Research</td>
<td>L 150</td>
</tr>
<tr>
<td>70%</td>
<td>Mining</td>
<td>F 120</td>
</tr>
<tr>
<td>6%</td>
<td>Research</td>
<td>L 210</td>
</tr>
<tr>
<td>5%</td>
<td>Research</td>
<td>L 98</td>
</tr>
<tr>
<td>5%</td>
<td>Research</td>
<td>L 212</td>
</tr>
<tr>
<td>5%</td>
<td>Metal</td>
<td>L 80</td>
</tr>
<tr>
<td>5%</td>
<td>Metal</td>
<td>L 140</td>
</tr>
<tr>
<td>5%</td>
<td>Metal</td>
<td>L 195</td>
</tr>
</tbody>
</table>
HWMA/RCRA PART B PERMIT
FOR THE IDAHO NATIONAL LABORATORY

Volume 18 – Idaho Nuclear Technology and Engineering Center

APPENDIX 6

Debris Treatment Processes
Holdup and Collection Tanks
CPP-659/-1659 Storage
CPP-666 FDP Cell Container Storage and Slab Tank Storage
Other Miscellaneous Treatment Processes
RMWSF (CPP-1617) Container Storage Area

PE CERTIFICATION OF SINKS, ULTRASONIC CLEANER,
AND HOLDUP/COLLECTION TANKS

Effective Date: April 27, 2009
NEW WASTE CALCINING
FACILITY (CPP-659)
TANK SYSTEMS
P.E. CERTIFICATION
REPORT
for the
RCRA PART B PERMIT
APPLICATION for
the INEL (Vol. 18)

Prepared By: Keith D. Hendrickson, P.E.
Idaho Registration Number 7765
Science Applications International Corp.
I certify that the design of the identified hazardous waste liquid tank systems in the New Waste Calcining Facility (CPP-659) at the Idaho Chemical Processing Plant (ICPP) at the Idaho National Engineering Laboratory (INEL) comply with the requirements of 40 CFR-264.190 Subpart J - Tank Systems for the storage and treatment of hazardous wastes in tank systems.

The following tank systems are certified for the storage and treatment of hazardous wastes:

- Sink (SH-NCD-933) in CPP-659 room 415.
- Sink (SH-NCD-934) in CPP-659 room 415.
- Ultrasonic Cleaner (UC-NCD-921) in CPP-659 room 415.
- Decon Hold-up Tank (VES-NCD-123) in CPP-659 room 219.
- Decon Collection Tank (VES-NCD-129) in CPP-659 room 203.

The underground portions of the Decon Hold-up Tank and the Decon Collection Tank ancillary piping to the tank farm (1 1/2"-PLAD-2628) and to the PEW evaporator (1 1/2"-PLAD-2629) are not covered by the Vol. 18 Part B RCRA permit application, and were therefore not assessed.
Sink (SH-NCD-933)

Description:

Sink (SH-NCD-933) is a 16 gauge series 300 stainless steel sink, 9'-11" x 2'-4" x 1'-6" deep. The sink is recessed in the counter of a hood that protects the room from spills and fumes from the sink. The sink is provided with a 1 ½" drain line that drains to the Decon Hold-up Tank (VES-NCD-123). Air emissions from the hood are vented to the vent air scrubber system. Decon solutions and water are provided inside the hood for use in the sink.

ASSESSMENT OF EXISTING TANK SYSTEM (40 CFR-264.191):

Design Standards:

The standard used for the series 300 stainless steel material to construct the sink is:

American Society for Testing and Materials (ASTM)
ASTM A167 Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

The codes and standards used for the design and construction of the sink are unknown.

Hazardous Characteristics of Waste:

Table 1 lists all treatment processes, the treatment solutions, the hazardous characteristics of the solutions, and the solution’s corrosivity to series 300 stainless steel.

Corrosion Protection Measures:

Corrosion protection for the sink is provided by materials of construction and corrosion allowances. Materials of construction were selected based on suitability for process service and compatibility with the treatment solutions. Series 300 stainless steel was selected for use in the sink. The corrosivity of the treatment solutions to stainless steel is listed in Table 1.

Age:

Sink (SH-NCD-933) was placed into service in 1982.

Integrity Examinations:

When in use, the sink is examined daily for signs of cracks, leaks, and corrosion. All signs of integrity deterioration are reviewed and corrective action taken.

Ancillary Equipment:

Ancillary equipment for the sink includes lines 1 ½"-PLAD-2640, 1 ½"-PLAD-4206, 3"-PLAD-4206, and 3"-PLAD-4211 which drain the sink to the Decon Hold-up Tank (VES-NCD-123).
CONTAINMENT AND DETECTION OF RELEASES (40 CFR-264.193):

Secondary Containment:

The secondary containment for sink (SH-NCD-933) is a 12'-0" x 31'-6" area in the Low Level Decon Room on the first level of CPP-569. The secondary containment area is separated from the rest of the room by a 10 GA stainless steel wall that forms part of the containment. The rest of the containment is provided by a 10 GA stainless steel floor liner and 6" curb on the outer wall.

The capacity of the sink is 237 gallons (31.7 ft³).

The capacity of the curbed area is 1.337 gallons (178.4 ft³), see Calculation #1.

Ancillary Equipment:

The sink drainage piping that is outside the curbed area in Low Level Decon Room is doubly encased until it reaches the decon hold-up tank cell. Here, the pipe encasement is diverted to the cell’s collection trench and the piping continues into the hold-up tank. The cell provides the secondary containment for the piping while in the cell. The cell trench drains to the Hot Sump Tank (VES-NCC-122) through 3"-PLAD-4215. The trench drain is provided with a level sensor (LE-219) that will activate alarm L-NC-219C in the NWCF control room if the sink drain pipe leaks. The cell and trench liner, the sink drain pipe encasement, the trench drain pipe, and the hot sump tank are all constructed of stainless steel.
Sink (SH-NCD-934)

Description:
Sink (SH-NCD-934) is a 16 gauge series 300 stainless steel sink, 18" x 20" x 18" deep. The sink is recessed in the counter of a hood that protects the room from spills and fumes from the sink. The sink is provided with a 1 ½" drain line that drains to the Decon Hold-up Tank (VES-NCD-123). Air emissions from the hood are vented to the vent air scrubber system. Decon solutions and water are provided inside the hood for use in the sink.

ASSESSMENT OF EXISTING TANK SYSTEM (40 CFR-264.191):

Design Standards:

The standard used for the series 300 stainless steel material to construct the sink is:

American Society for Testing and Materials (ASTM)
ASTM A 167 Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

The codes and standards used for the design and construction of the sink are unknown.

Hazardous Characteristics of Waste:

Table 1 lists all treatment processes, the treatment solutions, the hazardous characteristics of the solutions, and the solution’s corrosivity to series 300 stainless steel.

Corrosion Protection Measures:

Corrosion protection for the sink is provided by materials of construction and corrosion allowances. Materials of construction were selected based on suitability for process service and compatibility with the treatment solutions. Series 300 stainless steel was selected for use in the sink. The corrosivity of the treatment solutions to stainless steel is listed in Table 1.

Age:
Sink (SH-NCD-934) was placed into service in 1982.

Integrity Examinations:

When in use, the sink is examined daily for signs of cracks, leaks, and corrosion. All signs of integrity deterioration are reviewed and corrective action taken.

Ancillary Equipment:
Ancillary equipment for the sink includes lines 1 ½"-PLAD-2641, 1 ½"-PLAD-4206, 3"-PLAD-4206, and 3"-PLAD-4211 which drain the sink to the Decon Hold-up Tank (VES-NCD-123).
CONTAINMENT AND DETECTION OF RELEASES (40 CFR-264.193):

Secondary Containment:

The secondary containment for sink (SH-NCD-934) is a 12'-0" x 31'-6" area in the Low Level Decon Room on the first level of CPP-659. The secondary containment area is separated from the rest of the room by a 10 GA stainless steel wall that forms part of the containment. The rest of the containment is provided by a 10 GA stainless steel floor liner and 6" curb on the outer wall.

The capacity of the sink is 28 gallons (3.7 ft³).

The capacity of the curbed area is 1.337 gallons (178.8 ft³), see Calculation#1.

Ancillary Equipment:

The sink drainage piping that is outside the curbed area in Low Level Decon Room is doubly encased until it reaches the decon hold-up tank cell. Here, the pipe encasement is diverted to the cell's collection trench and the piping continues into the hold-up tank. The cell provides the secondary containment for the piping while in the cell. The cell trench drains to the Hot Sump Tank (VES-NCC-122) through 3"-PLAD-4215. The trench drain is provided with a level sensor (LE-219) that will activate alarm L-NC-219C in the NWCF control room if the sink drain pipe leaks. The cell and trench liner, the sink drain pipe encasement, the trench drain pipe, and the hot sump tank are all constructed of stainless steel.
Ultrasonic Cleaner (UC-NCD-921)

Description:

Ultrasonic Cleaner (UC-NCD-921) is a 16 gauge series 300 stainless steel sink, 2'-2" x 2'-2" x 2'-3" deep. The sink is built into a protective box with a hood that projects the room from spills and fumes from the cleaner. The cleaner is provided with a 1 ½" drain line that drains to the Decon Hold-up Tank (VES-NCD-123). Air emissions from the hood are vented to the vent air scrubber system.

ASSESSMENT OF EXISTING TANK SYSTEM (40 CFR-264.191):

Design Standards:

The standard used for the series 300 stainless steel material to construct the ultrasonic cleaner is:

American Society for Testing and Materials (ASTM)
ASTM A167 Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

The codes and standards used for the design and construction of the ultrasonic cleaner are unknown.

Hazardous Characteristics of Waste:

Table 1 lists all treatment processes, the treatment solutions, the hazardous characteristics of the solutions, and the solution’s corrosivity to series 300 stainless steel.

Corrosion Protection Measures:

Corrosion protection for the ultrasonic cleaner is provided by materials of construction and corrosion allowances. Materials of construction were selected based on suitability for process service and compatibility with the treatment solutions. Series 300 stainless steel was selected for use in the ultrasonic cleaner. The corrosivity of the treatment solutions to stainless steel is listed in Table 1.

Age:

Ultrasonic Cleaner (UC-NCD-921) was placed into service in 1982.

Integrity Examinations:

When in use, the ultrasonic cleaner is examined daily for signs of cracks, leaks, and corrosion. All signs of integrity deterioration are reviewed and corrective action taken.

Ancillary Equipment:

Ancillary equipment for the ultrasonic cleaner includes lines 1 ½"-PLAD-2643, 3"-PLAD-4206, and 3"-PLAD-4211 which drain the cleaner to the Decon Hold-up Tank (VES-NCD-123).
CONTAINMENT AND DETECTION OF RELEASES (40 CFR-264.193):

Secondary Containment:

The secondary containment for the ultrasonic cleaner (UC-NCD-921) is a 12'-0" x 31'-6" area in the Low Level Decon Room on the first level of CPP-659. The secondary containment area is separated from the rest of the room by a 10 GA stainless steel wall that forms part of the containment. The rest of the containment is provided by a 10 GA stainless steel floor liner and 6" curb on the outer wall.

The capacity of the ultrasonic cleaner is 79 gallons (10.6 ft³).

The capacity of the curbed area is 1.337 gallons (178.8 ft³), see Calculation#1.

Ancillary Equipment:

The cleaner drainage piping that is outside the curbed area in Low Level Decon Room is doubly encased until it reaches the decon hold-up tank cell (room 219). Here, the pipe encasement is diverted to the cell's collection trench and the piping continues into the hold-up tank. The cell provides the secondary containment for the piping while in the cell. The cell trench drains to the Hot Sump Tank (VES-NCC-122) through 3"-PLAD-4215. The trench drain is provided with a level sensor (LE-219) that will activate alarm L-NC-219C in the NWCF control room if the cleaner drain pipe leaks. The cell and trench liner, the sink drain pipe encasement, the trench drain pipe, and the hot sump tank are all constructed of stainless steel.
Decon Hold-up Tank (VES-NCD-123)

Description:

Decon Hold-up Tank (VES-NCD-123) is a 304L stainless steel tank, 7'-0" diameter by 9'-0" long tangent to tangent, with a capacity of 3,800 gallons (508 ft³). The tank is horizontally mounted with a support saddle at both ends. The tank is provided with a 2" drain line that goes to Decon Hold-up Tank Pump (P-NCD-223).

ASSESSMENT OF EXISTING TANK SYSTEM (40 CFR-264.191):

Design Standards:

The standard used for the series 300 stainless steel material to construct the tank is:

American Society for Testing and Materials (ASTM)
ASTM A167 Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

The code used for the design and construction of the tank is:

American Society of Mechanical Engineers (ASME)
ASME Boiler and Pressure Vessel Code, Section VIII, Div. 1, Pressure Vessels

Hazardous Characteristics of Waste:

Table 1 lists all treatment processes, the treatment solutions, the hazardous characteristics of the solutions, and the solution's corrosivity to series 300 stainless steel.

Corrosion Protection Measures:

Corrosion protection for the tank is provided by materials of construction and a 0.135" corrosion and cleaning allowance. Materials of construction were selected based on suitability for process service and compatibility with the treatment solutions. Series 300 stainless steel was selected for use in the tank. The corrosivity of the treatment solutions to stainless steel is listed in Table 1.

Age:

Decon Hold-up Tank (VES-NCD-123) was placed into service in 1982.

Integrity Examinations:

The tank is continuously monitored for leaks by the drain line 3"-PLAD-4215 level sensor (LE-219) which will activate alarm L-NC-219C in the NWCFL control room if the tank leaks. The tank is examined during each cell entry for signs of cracks, leaks, and corrosion. All signs of integrity deterioration are reviewed and corrective action taken.
Ancillary Equipment:

Ancillary equipment for the Decon Hold-up Tank includes the tank drain line (2"-PLAD-2631) which runs to the Decon Hold-up Tank Pump (P-NCD-223), and the following lines which run from the pump to the listed designations:

- 1 ½"-PLAD-2632 to 1 ½"-PLAD-2628 to the Tank Farm
- 1 ½"-PLAD-2634 to 1 ½"-PLAD-2629 to the PEW Evaporator
- 1 ½"-SWAD-2633 to 4"-SWNB-4157 to the Service Waste System *

* This line has a blind flange between lines 1 ½"-SWAD-2633 and 4"-SWNB-4157 to prevent transfers to the service waste system.

CONTAINMENT AND DETECTION OF RELEASES (40 CFR-264.193):

Secondary Containment:

The secondary containment for Decon Hold-up Tank (VES-NCD-123) is the Decon Hold-up Tank Cell (Room 219), the Manipulator Parking and Maintenance Area (Room 218), and the Filter Cell and Lower Valve Cubicle (Room 216) on the third level of CPF-659. The Hold-up Tank Cell is 14'-4" x 14'-9". The Manipulator Parking and Maintenance Area is 12'-8" x 16'-2", the Filter Cell is 22'-6" x 13'-2", and the Lower Valve Cubicle is 27'-8" x 9'-9". All four areas have a stainless steel floor liner, and a curb that is 6" above the high point of the floor.

The capacity of the hold-up tank cell is 3,800 gallons (508 ft³).

The capacity of the hold-up tank secondary containment is 4,685 gallons (626.4 ft³), see Calculation #2.

The hold-up tank cell's trench drains to the Hot Sump Tank (VES-NCC-122) through 3"-PLAD-4215. The drain is provided with a level sensor (LE-219) that will activate alarm L-NC-219C in the NWCF control room if the tank leaks. The manipulator parking and maintenance area's trench drains to the hot sump tank through 2"-PLAD-4213 and 3"-PLAD-4212. The filter cell's trench drains to the hot sump tank through 3"-PLAD-4212. The lower valve cubicle's trench drains to the hot sump tank (VES-NCC-119) through 3"-PLAD-4220. The cell and trench liners, the trench drain pipes, and the hot sump tanks are all constructed of stainless steel.

Ancillary Equipment:

The tank ancillary equipment secondary containment is provided by the Decon Hold-up Tank Cell, the Decon Collection Tank & Pump Cell, and the Lube Oil Console Room.

At the point where lines 1 ½"-PLAD-2629 to the PEW Evaporator, and 1 ½"-PLAD-2628 to the Tank Farm leave the pump cell, they are no longer covered by the Vol. 18 Part B permit application.

Line 1 ½"-SWAD-2633 to the service waste system (4"-SWNB-4157) is blind flanged in the Lube Oil Console Room to prevent transfers to the service waste system. After the blind flange, the line is considered part of the service waste system and not covered by this application.

The cell trenches drain to the Hot Sump Tank (VES-NCC-122) through 3"-PLAD-4215. The trench drain is provided with a level sensor (LE-219) that will activate alarm L-NC-219C in the NWCF control room if the ancillary equipment leaks. The cell and trench liner, the trench drain pipe, and the hot sump tank are all constructed of stainless steel.
Decon Collection Tank (VES-NCD-129)

Description:

Decon Collection Tank (VES-NCD-129) is a 304L stainless steel tank, 4'-0" diameter by 5'-6" tall tangent to tangent, with a capacity of 530 gallons (71 ft³). The tank is vertically mounted with four support legs. The tank is provided with a 2" drain line that goes to Decon Collection Tank Pump (P-NCD-229).

ASSESSMENT OF EXISTING TANK SYSTEM (40 CFR-264.191):

Design Standards:

The standard used for the series 300 stainless steel material to construct the tank is:
- American Society for Testing and Materials (ASTM)
  - ASTM A167  Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

The code used for the design and construction of the tank is:
- American Society of Mechanical Engineers (ASME)
  - ASME Boiler and Pressure Vessel Code, Section VIII, Div. 1, Pressure Vessels

Hazardous Characteristics of Waste:

Table 1 lists all treatment processes, the treatment solutions, the hazardous characteristics of the solutions, and the solution’s corrosivity to series 300 stainless steel.

Corrosion Protection Measures:

Corrosion protection for the tank is provided by materials of construction and a 0.135" corrosion and cleaning allowance. Materials of construction were selected based on suitability for process service and compatibility with the treatment solutions. Series 300 stainless steel was selected for use in the tank. The corrosivity of the treatment solutions to stainless steel is listed in Table 1.

Age:

Decon Collection Tank (VES-NCD-129) was placed into service in 1982.

Integrity Examinations:

The tank is continuously monitored for leaks by the drain line 3"-PLAD-4215 level sensor (LE-219) which will activate alarm L-NC-219C in the NWCF control room if the tank leaks. The tank is examined during each cell entry for signs of cracks, leaks, and corrosion. All signs of integrity deterioration are reviewed and corrective action taken.
Ancillary Equipment:

Ancillary equipment for the Decon Collection Tank includes the tank drain line (2"-PLAD-2627) which runs to the Decon Collection Tank Pump (P-NCD-229), and the following lines which run from the pump to the listed designations:

1 ¼"-PLAD-2628  to the Tank Farm
1 ¼"-PLAD-2629  to the PEW Evaporator
1 ½"-PLAD-2630  to the Decon Hold-up Tank
1 ¾"-DCAF-2635  to the Decon Cell (abandoned in place)

CONTAINMENT AND DETECTION OF RELEASES (40 CFR-264.193):

Secondary Containment:

The secondary containment for Decon Collection Tank (VES-NCD-129) is the Decon Collection Tank and Pump Cell on the third level of CPP-659. The collection tank area is approximately 7'-10" x 10'-0", and the pump area is approximately 5'-0" x 10'-6". Both areas are provided with a 10 GA stainless steel floor liner, and a curb that is 6" above the high point of the floor.

The capacity of the Decon Collection Tank is 530 gallons (71 ft³).

The capacity of the collection tank secondary containment is 593 gallons (79.3 ft³), see Calculation #3.

The decon collection tank and pump cell trenches drain to the Hot Sump Tank (VES-NCC-122) through 3"-PLAD-4215. The drain is provided with a level sensor (LE-219) that will activate alarm L-NC-219C in the NWCF control room if the tank leaks. The cell and trench liners, the trench drain pipes, and the hot sump tank are all constructed of stainless steel.

Ancillary Equipment:

The tank ancillary equipment secondary containment is provided by the Decon Collection Tank & Pump Cell, and the Decon Hold-up Tank Cell.

At the point where lines 1 ¼"-PLAD-2629 to the PEW Evaporator, and 1 ¾"-PLAD-2628 to the Tank Farm leave the pump cell, they are no longer covered by the Vol. 18 Part B permit application.

Line 1 ¼"-DCAF-2635 from the decon collection tank pump (P-NCD-229) to the Decon Cell is abandoned in place and is no longer used.

The trenches in the collection tank and pump areas drain to the Hot Sump Tank (VES-NCC-122) through 3"-PLAD-4215. The trench drains are provided with a level sensor (LE-219) that will activate alarm L-NC-219C in the NWCF control room if the ancillary equipment leaks. The cell and trench liner, the trench drain pipe, and the hot sump tank are all constructed of stainless steel.
Calculation #1

Sinks and Ultrasonic Cleaner Secondary Containment

Description:

The secondary containment for the sinks (SH-NCD-933 & SH-NCD-934) and the ultrasonic cleaner (UC-NCD-921) is a curbed area in the Low Level Decon Room on the first level of CPP-659. The curbed area has two sections which are approximately 12'-0" x 16'-0" and 10'-6" x 16'-0". The curbed area is constructed of stainless steel, and the curb is 6" above the high point of the floor. The curbed area is not sloped, and does not have a floor drain.

Sink (SH-NCD-933) has a capacity of 237 gal. (31.7 ft³).
Sink (SH-NCD-934) has a capacity of 28 gal. (3.7 ft³).
Ultrasonic Cleaner (UC-NCD-921) has a capacity of 79 gal. (10.6 ft³).

Elevations:

<table>
<thead>
<tr>
<th>Top of curb</th>
<th>4917'-6&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of floor</td>
<td>4917'-0&quot;</td>
</tr>
</tbody>
</table>

Volume:

<table>
<thead>
<tr>
<th>Volume from floor to top of curb</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{at}$ 12'-0&quot; x 16'-0&quot; x 0'-6&quot;</td>
<td>96.0 ft³</td>
</tr>
<tr>
<td>$V_{at}$ 10'-6&quot; x 16'-0&quot; x 0'-6&quot;</td>
<td>84.0 ft³</td>
</tr>
</tbody>
</table>

Volume removed due to wall footings

<table>
<thead>
<tr>
<th>Volume removed</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_n$ 1'-6&quot; x 0'-6&quot; x 0'-6&quot;</td>
<td>0.375 ft³</td>
</tr>
<tr>
<td>$V_n$ 1'-6&quot; x 0'-6&quot; x 0'-6&quot;</td>
<td>0.375 ft³</td>
</tr>
<tr>
<td>$V_n$ 1'-0&quot; x 1'-0&quot; x 0'-6&quot;</td>
<td>0.500 ft³</td>
</tr>
</tbody>
</table>

Total volume available for secondary containment for the Sinks and Ultrasonic Cleaner

$$ Vol = 178.8 \text{ ft}^3 \ (1,337 \text{ gal}) $$
Calculation #2

Decon Hold-up Tank (VES-NCD-123) Secondary Containment

The Decon Hold-up Tank is a 304L stainless steel tank, 7'-0" diameter by 9'-0" long tangent to tangent, with a capacity of 3,800 gallons (508 ft³). The secondary containment for this tank is the Decon Hold-up Tank Cell, the Manipulator Parking and Maintenance Area, the Filter Cell, and the Lower Valve Cubicle on the third level of CPP-559. After a tank rupture, the hold-up tank cell will fill up to the bottom of the door to the manipulator room. The manipulator room will then fill up to the bottom of the door to the filter cell. The filter cell and valve cubicle will then fill until the total volume in the tank is contained.

Decon Hold-up Tank Cell

Description:

The decon hold-up tank cell is 14'-9" x 14'-4", lined with 10 GA stainless steel, and sloped from the north wall to a 1' wide trench along the south wall of the cell. The cell has a curb that is 6" above the floor, two 1'0" x 7'-8" pedestals for the hold-up tank, and a door in the north wall to the manipulator parking room.

Elevations:

<table>
<thead>
<tr>
<th>Elevation</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom of door to manipulator room</td>
<td>4882'-3&quot;</td>
</tr>
<tr>
<td>Bottom of curb &amp; top of sloped floor</td>
<td>4881'-6&quot;</td>
</tr>
<tr>
<td>Bottom of sloped floor</td>
<td>4881'-4&quot;</td>
</tr>
<tr>
<td>Bottom of trench</td>
<td>4880'-9&quot; (average)</td>
</tr>
</tbody>
</table>

Volume:

\[
V_n = \frac{1}{2} \times 13'-9" \times 14'-4" \times 0'-2" = 16.4 \text{ ft}^3
\]

\[
V_{tt} = 1'-0" \times 14'-4" \times 0'-9" = 10.7 \text{ ft}^3
\]

\[
V_{sl} = 14'-9" \times 14'-4" \times 0'-9" = 158.6 \text{ ft}^3
\]

\[
V_{pl} = 2 \times 1'-0" \times 7'-8" \times 0'-11" = 14.0 \text{ ft}^3
\]

Total Volume available in the Decon Hold-up Tank Cell

\[
V_1 = 171.7 \text{ ft}^3 (1,284 \text{ gallons})
\]

Manipulator Parking and Maintenance Area

Description:

The manipulator parking and maintenance area is 12'-8" x 16'-2". The room is lined with 10 GA stainless steel, and sloped from the west wall to a 1' wide trench near the east wall of the cell. The cell floor is at four different elevations, the west section is level with the door from the hold-up tank cell, the middle section is 8" below the west section, the trench is east of the middle section, and the along the east wall is a 1'-0" wide
section that is the same height as the door to the filter cell. The cell has a curb that is 6" above the level of the
doors to the filter cell. A 1'-6" thick shielding wall separates the western section into two areas. Because the
average elevation of the western section is only 1/4" below the elevation of the exit door to the filter cell, no
credit will be taken for the volume of liquid in this area. Also, because the eastern section is at the same
elevation as the bottom of the door to the filter cell, no credit will be taken for the volume of liquid that will
be in this area.

**Elevations:**

- Bottom of door to filter cell: 4882'-2 3/4"
- Average elevation of western section: 4882'-2 1/2"
- Average elevation of middle section: 4881'-5 1/2"
- Top of eastern section: 4882'-2 3/4"
- Bottom of trench: 4880'-7" (average)

**Volume:**

- Volume above middle section of floor to bottom of door
  \[ V_m = 4'-8" \times 16'-2" \times 0'-9 1/4" = 58.2 \text{ ft}^3 \]

- Volume in and above trench to bottom of door
  \[ V_{mt} = 1'-0" \times 12'-2" \times 1'-7 3/4" = 20.0 \text{ ft}^3 \]

**Total Volume available in the Manipulator Parking and Maintenance Area**

\[ V_1 = 78.2 \text{ ft}^3 (585 \text{ gal.}) \]

**Filter Cell**

**Description:**

The filter cell is 22'-6" x 13'-2", and is lined with 10 GA stainless steel, and sloped from the north wall to a 1'
wide trench along the southern wall of the cell. The cell also has a curb that is 6" above the high point of the
floor.

**Elevations:**

- Top of curb: 4882'-0"
- Top of sloped floor: 4881'-6"
- Bottom of sloped floor: 4881'-3 1/4"
- Bottom of trench: 4880'-8" (average)

**Volume**

- Volume above floor to bottom of curb
  \[ V_m = \frac{1}{2} \times 22'-6" \times 12'-2" \times 0'-2 \frac{3}{4}" = 31.4 \text{ ft}^3 \]

- Volume in and above trench to bottom of curb
  \[ V_{mt} = 22'-6" \times 13'-2" \times 0'-10" = 18.8 \text{ ft}^3 \]

- Volume from bottom to top of curb
  \[ V_{bt} = 22'-6" \times 13'-2" \times 0'-6" = 148.1 \text{ ft}^3 \]

**Total Volume available in the Filter Cell**

\[ V_1 = 198.3 \text{ ft}^3 (1,483 \text{ gal.}) \]
Lower Valve Cubicle

Description:

The lower valve cubicle is 27'-8" x 9'-0", and is lined with 10 GA stainless steel, and sloped from the north wall to a 1' wide trench along the southern wall of the cell. The cell also has a curb that is 6" above the high point of the floor.

Elevations:

<table>
<thead>
<tr>
<th>Top of curb</th>
<th>-</th>
<th>4882'-0&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of sloped floor</td>
<td>-</td>
<td>4881'-6&quot;</td>
</tr>
<tr>
<td>Bottom of sloped floor</td>
<td>-</td>
<td>4881'-4&quot;</td>
</tr>
<tr>
<td>Bottom of trench</td>
<td>-</td>
<td>4880'-8&quot; (average)</td>
</tr>
</tbody>
</table>

Volume:

Volume above floor to bottom of curb
\[ V_n = \frac{1}{2} \times 27'-8" \times 8'-9" \times 0'-2" \]
\[ = 20.2 \text{ ft}^3 \]

Volume in and above trench to bottom of curb
\[ V_{nt} = 1'-0" \times 27'-8" \times 0'-10" \]
\[ = 23.1 \text{ ft}^3 \]

Volume from bottom to top of curb
\[ V_{nt} = 27'-8" \times 9'-9" \times 0'-6" \]
\[ = 134.9 \text{ ft}^3 \]

Total Volume available in the Lower Valve Cubicle
\[ V_t = 178.2 \text{ ft}^3 (1,333 \text{ gal}) \]

Total volume available for secondary containment for the Decon Hold-up Tank
\[ V_{ol} = 626.4 \text{ ft}^3 (4,685 \text{ gal}) \]
Calculation #3

Decon Collection Tank (VFS-NCD-129) Secondary Containment

Description:

The Decon Collection Tank is a 304L stainless steel tank, 4’-0" diameter by 5’-6" tall tangent to tangent, with a capacity of 530 gallons (71 ft$^3$). The secondary containment for this tank is the curbed area in the Decon Collection Tank & Pump Cell on the third level of CPP-659. The cell is divided into two separate areas; the decon collection tank area and the decon pump area. The decon collection tank area is a 10’-0" x 7’-10", and the decon pump area is a 10’-0" x 5’-9". The whole cell is lined with 10 GA stainless steel and sloped from the southern wall to 1’ wide trenches along the north wall of both areas. The cell also has a curb that is 6" above the high point of the floor.

Elevations:

- Top of curb: 4883-6"
- Top of sloped floor: 4882-0"
- Bottom of sloped floor: 4882-10"
- Bottom of trench: 4882-7" (highest)

Volumes:

Decon Collection Tank Area

Volume above floor to bottom of curb
$$V_a = \frac{1}{2} \times 9’-0” \times 7’-10” \times 0’-2”$$
$$= 5.9 \text{ ft}^3$$

Volume in and above trench to bottom of curb
$$V_{at} = 1’-0” \times 7’-10” \times 0’-5”$$
$$= 3.3 \text{ ft}^3$$

Volume from bottom to top of curb
$$V_t = 10’-0” \times 7’-10” \times 0’-6”$$
$$= 39.2 \text{ ft}^3$$

Total Volume available in the Decon Collection Tank Area
$$V_1 = 48.4 \text{ ft}^3$$

Decon Hold-up and Collection Tank Pump Area

Volume above floor to bottom of curb
$$V_a = \frac{1}{2} \times 9’-0” \times 5’-0” \times 0’-2”$$
$$= 3.8 \text{ ft}^3$$

Volume in and above trench to bottom of curb
$$V_{at} = 1’-0” \times 5’-0” \times 0’-5”$$
$$= 2.1 \text{ ft}^3$$

Volume from bottom to top of curb
$$V_t = 10’-0” \times 5’-0” \times 0’-6”$$
$$= 25.0 \text{ ft}^3$$

Total Volume available in the Decon Pump Area
$$V_2 = 30.9 \text{ ft}^3$$

Total volume available for secondary containment for the Decon Collection Tank
$$Vol = 79.3 \text{ ft}^3 \text{ (593 gal.)}$$
<table>
<thead>
<tr>
<th>Treatment Number</th>
<th>Treatment (Solutions)</th>
<th>Hazardous Characteristic</th>
<th>Corrosivity to Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vacuum</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>2</td>
<td>L.P. Steam</td>
<td>n/a</td>
<td>none</td>
</tr>
<tr>
<td>3</td>
<td>M.P. Steam</td>
<td>n/a</td>
<td>none</td>
</tr>
<tr>
<td>4</td>
<td>H.P. Water</td>
<td>n/a</td>
<td>none</td>
</tr>
<tr>
<td>5</td>
<td>Detergent (Turco 4324)</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>6</td>
<td>Radioclean</td>
<td>caustic</td>
<td>none</td>
</tr>
<tr>
<td>7</td>
<td>Ajax</td>
<td>caustic</td>
<td>n/a</td>
</tr>
<tr>
<td>8</td>
<td>Clinic Acid</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>9</td>
<td>Tartaric Acid 0.7M</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>10</td>
<td>El-Be-Griz</td>
<td>caustic</td>
<td>none</td>
</tr>
<tr>
<td>11</td>
<td>Methyl Chloroform</td>
<td>caustic</td>
<td>n/a</td>
</tr>
<tr>
<td>12</td>
<td>Oxalic Acid 5%</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>13</td>
<td>Oxalic Acid 0.5M</td>
<td>acidic</td>
<td>eight</td>
</tr>
<tr>
<td>14</td>
<td>Ultrasonic</td>
<td>n/a</td>
<td>Used with solutions from treatment #s 5, 8, 15, &amp; 23.</td>
</tr>
<tr>
<td>15</td>
<td>Turco 4521</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>16</td>
<td>Turco 4300-D</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>17</td>
<td>Nitric Acid 1M</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>18</td>
<td>Nitric Acid 8M</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>19</td>
<td>Nitric Acid 6M</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>20</td>
<td>Aluminum Nitrate 0.3M</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>21</td>
<td>Turco XO-138-W</td>
<td>acidic</td>
<td>high</td>
</tr>
<tr>
<td>22</td>
<td>Phosphoric Acid 50%</td>
<td>acidic</td>
<td>low</td>
</tr>
<tr>
<td>23</td>
<td>Phosphoric Acid 50%</td>
<td>acidic</td>
<td>low</td>
</tr>
<tr>
<td>24</td>
<td>Turco 4512-A or Phosphoric Acid 2M</td>
<td>acidic</td>
<td>low</td>
</tr>
<tr>
<td>25</td>
<td>Potassium Permanganate 0.05M</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>26</td>
<td>Turco 4521</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>27</td>
<td>Ammonium Oxalate 0.4M</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>28</td>
<td>Citric Acid 0.18M</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>29</td>
<td>Hydrogen Peroxide 0.34M</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>30</td>
<td>Sulfuric Acid 4M</td>
<td>acidic</td>
<td>moderate</td>
</tr>
<tr>
<td>31</td>
<td>Turco Reul Remover</td>
<td>caustic</td>
<td>none</td>
</tr>
<tr>
<td>32</td>
<td>Sodium Hydroxide 1.5M</td>
<td>caustic</td>
<td>none</td>
</tr>
<tr>
<td>33</td>
<td>EDTA 0.05M</td>
<td>caustic</td>
<td>none</td>
</tr>
<tr>
<td>34</td>
<td>Turco 4502 10%</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>35</td>
<td>Turco 4502 6%</td>
<td>acidic</td>
<td>low</td>
</tr>
<tr>
<td>36</td>
<td>Oxalic Acid 0.9M or Turco 4521</td>
<td>acidic</td>
<td>low</td>
</tr>
<tr>
<td>37</td>
<td>Turco 4502 8%</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>38</td>
<td>Sodium Hydroxide 10%</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>39</td>
<td>Tartaric Acid 2%</td>
<td>acidic</td>
<td>none</td>
</tr>
<tr>
<td>40</td>
<td>Nitric Acid 1M</td>
<td>acidic</td>
<td>low</td>
</tr>
<tr>
<td>41</td>
<td>Sulfuric Acid 6M</td>
<td>acidic</td>
<td>low</td>
</tr>
<tr>
<td>42</td>
<td>Hydrofluoric 0.05M</td>
<td>acidic</td>
<td>low</td>
</tr>
<tr>
<td>43</td>
<td>Sulfuric Acid 1M</td>
<td>acidic</td>
<td>high</td>
</tr>
<tr>
<td>44</td>
<td>Hydrofluoric 0.5M</td>
<td>acidic</td>
<td>moderate</td>
</tr>
<tr>
<td>45</td>
<td>Nitric Acid 3M</td>
<td>acidic</td>
<td>moderate</td>
</tr>
<tr>
<td>46</td>
<td>Oxalic Acid 0.4M</td>
<td>acidic</td>
<td>moderate</td>
</tr>
<tr>
<td>47</td>
<td>Hydrofluoric 0.1M</td>
<td>acidic</td>
<td>moderate</td>
</tr>
<tr>
<td>48</td>
<td>Hydrogen Peroxide 0.05M</td>
<td>acidic</td>
<td>moderate</td>
</tr>
<tr>
<td>49</td>
<td>Grinding</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
HWMA/RCRA PART B PERMIT
FOR THE IDAHO NATIONAL LABORATORY

Volume 18 – Idaho Nuclear Technology and Engineering Center

APPENDIX 7

Debris Treatment Processes
Holdup and Collection Tanks
CPP-659/-1659 Storage
CPP-666 FDP Cell Container Storage and Slab Tank Storage
Other Miscellaneous Treatment Processes
RMWSF (CPP-1617) Container Storage Area

PE ASSESSMENT OF HFLS TANK DESIGN

Effective Date: April 27, 2009
Certification Document for the Design of the NWCF HEPA FILTER LEACHING SYSTEM MODIFICATIONS PROJECT

Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

Submitted To:
Westinghouse Idaho Nuclear Company, Inc.

August 16, 1993
CERTIFICATION DOCUMENT
FOR THE DESIGN OF THE
NWCF HEPA FILTER LEACHING SYSTEM MODIFICATIONS PROJECT

Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

Prepared for:
Westinghouse Idaho Nuclear Company, Inc.
Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

August 16, 1993

ETAS Corporation
DESIGN CERTIFICATION OF
NWCF HEPA FILTER LEACHING SYSTEM
MODIFICATIONS PROJECT
Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho


This certification is limited to the HEPA Filter Leaching System as set forth in the attached document. Further, this certification is limited to the design only, and does not include installation of the system.

We certify under penalty of law that this document and all attachments were prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Stanley A. Heath, Ph.D., Project/QA Manager
ETAS Corporation

T. Y. Richard Lo, P.E., Ph.D., Lead Engineer
ETAS Corporation

James S. Kilburn, P.E., Idaho Professional Engineer
ETAS Corporation

8-20-93
8-28-93

ETAS
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CERTIFICATION</td>
<td>i</td>
</tr>
<tr>
<td>1.0 INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2.0 CERTIFICATION TEAM</td>
<td>2</td>
</tr>
<tr>
<td>3.0 DESIGN ASSESSMENT</td>
<td>3</td>
</tr>
<tr>
<td>3.1 Description</td>
<td>3</td>
</tr>
<tr>
<td>3.1.1 Filter Handling Cell</td>
<td>3</td>
</tr>
<tr>
<td>3.1.2 Leaching Vessel</td>
<td>4</td>
</tr>
<tr>
<td>3.1.3 Drying Vessel</td>
<td>4</td>
</tr>
<tr>
<td>3.1.4 Filter Handling Table</td>
<td>4</td>
</tr>
<tr>
<td>3.1.5 Piping</td>
<td>5</td>
</tr>
<tr>
<td>3.2 Design</td>
<td>6</td>
</tr>
<tr>
<td>3.2.1 Regulatory Requirements</td>
<td>6</td>
</tr>
<tr>
<td>3.2.2 Structural Integrity Assessment</td>
<td>7</td>
</tr>
<tr>
<td>3.2.3 Secondary Containment Assessment</td>
<td>8</td>
</tr>
<tr>
<td>3.2.4 Summary of Assessment</td>
<td>10</td>
</tr>
<tr>
<td>4.0 CONDITIONS OF ATTESTATION</td>
<td>11</td>
</tr>
<tr>
<td>REFERENCES</td>
<td></td>
</tr>
<tr>
<td>APPENDICES</td>
<td></td>
</tr>
<tr>
<td>Appendix A: Pertinent Environmental Regulations</td>
<td></td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

High efficiency particulate air (HEPA) filters used at the Idaho Chemical Processing Plant (ICPP) are stored after use in the cells where they are used. The HEPA Filter Leaching System located in the New Waste Calcining Facility (NWCF) (building CPP-659) at the ICPP was designed to leach transuranic elements, heavy metals, or both from the filters so that they can be disposed of at the Radioactive Waste Management Complex (RWMC) (Reference 1b). The filters are leached several times with heated nitric acid, followed by water washes and hot air drying. This project modifies the existing system to better meet the disposal criteria for the filters. System components include a leaching vessel, a drying vessel, associated piping and instrumentation, and the Filter Handling Cell (FHC) containing the system. Waste liquids from this system drain into vessels in a cell below the FHC.

The certification provided herein by ETAS is limited to the design of vessels and ancillary equipment being installed in the FHC, and the existing FHC stainless steel liner and drain line. The design of these components is assessed to ensure that the applicable standards and requirements of 40 CFR 265.192 and 40 CFR 265.193 are met. No certification of the adequacy of the design to meet the operating criteria is provided by ETAS. As the basis of this certification, this certification document provides signatures and statements of those persons providing the certification as specified in the applicable sections of the 40 CFR 265.192 and 40 CFR 270.11 (d).
2.0 CERTIFICATION TEAM

The ETAS certification team was composed of three qualified professionals. The Lead Engineer, Dr. T. Y. Richard Lo, is a registered professional engineer with 16 years of experience in hazardous waste and environmental engineering. He is responsible for the overall certification and attestation that under the conditions specified in this certification document the new piping system meets the requirements of 40 CFR 265. The Project Manager, Dr. Stanley A. Heath, has had 14 years experience in chemical plant operations and environmental compliance. He audited the pertinent documents to ensure veracity, for accurate and complete documentation, and for field checking that the work was well documented. Mr. James S. Kilburn is a registered Idaho professional engineer with over 40 years of engineering experience, much of it related to tank and piping systems. He reviewed the engineering design, provided other document and construction checking, and provided certification as per 40 CFR 265 and Idaho hazardous waste regulations.
3.0 DESIGN ASSESSMENT

3.1 Description

This project provides for improvements in the filter handling capabilities, more complete leaching of HEPA filter contaminants, improved filter drying, and adequate secondary containment. Operational aspects of the system are discussed in the project feasibility study (Reference 1a). Included in the modifications are a new filter leaching vessel, a new filter drying vessel, modifications to the filter handling table, and associated process, drain, and sample lines. All stainless steel materials used in this system are AISI Type 304L.

3.1.1 Filter Handling Cell

The Filter Handling Cell (FHC) houses the HEPA Filter Leaching System. The FHC is located in the Decontamination Area of the NWCF within the ICPP. The Decontamination Area consists of two adjoining cells, the Decontamination Cell and the Filter Handling Cell. The FHC is 16 by 20 feet by 19 feet high, with walls and ceiling of three foot thick reinforced concrete. The walls and floor are lined with stainless steel. A shielded window provides a view of the interior of the cell from the operating corridor (Reference 3).

Hatches located in the ceiling of the filter cell provide overhead access. Transfer of HEPA filters into the cell is done remotely using a crane to handle the filters and/or filter containers. Once in the cell, handling of the filters is done remotely using a pair of master/slave manipulators on the left and right sides of the window, an electro-mechanical PaR, and an overhead crane in the cell (Reference 3). The cell floor slopes toward a trench located on the east side of the cell and the trench slopes to the south to a drain.
The drain, where it penetrates the floor, is a double-walled pipe. The drain is routed to the decontamination hold-up tank, VES-NCD-123, or the decontamination collection tank, VES-NCD-129, located in a cell below the FHC.

3.1.2 Leaching Vessel

The leaching vessel, VES-NCD-141, is constructed of 3/8" thick 304L stainless steel, and is approximately 2'11" by 2'5" by 2'2" high, with a bottom sloping to a 1" drain line and a flat lid. Drawings 444397 and 444398 (Reference 2) show construction and design details, including the various nozzles for acid, water, and steam/air supply lines, instrument lines, and sample lines. The capacity is about 120 gallons. The vessel is equipped with a sparger in the bottom to improve leaching efficiency.

3.1.3 Drying Vessel

The drying vessel, VES-NCD-142, is constructed of 3/8" 304L stainless steel, and is approximately 2'11" by 2'5" by 1'4" high with a flat lid. The capacity is about 70 gallons. Drawings 444397 and 444399 (Reference 2) show internal and nozzle details.

3.1.4 Filter Handling Table

The filter handling table is used to hold the filters when they are not in the leaching or drying vessels. The filters are also placed on the table following leaching to allow excess liquid to drain from the filters prior to placement in the drying vessel. The existing table is constructed entirely of stainless steel with an open grating surface (Reference 1a). The table will be modified to include a drip pan of 14 gauge stainless steel under the open grating to provide collection of liquid draining from the filters. The drip pan is sloped to
a drain line at the low point. A splash guard between the leaching vessel and the filter handling table prevents spills during transfer of filters from vessel to table. Details are shown in drawings 444404 and 444405 (Reference 2).

3.1.5 Piping

Hazardous waste piping being installed includes vessel drain lines, sample lines, and an overflow line. Various other lines not carrying hazardous waste include air, nitric acid, steam, and water supply lines and vent lines from the two vessels. All lines in the FHC are constructed of stainless steel.

The drain line from the leaching vessel, 1 1/2" PL-AR-109033, is welded stainless steel, and is routed directly to the floor drain. The overflow line, 1" PL-AR-109010, also ties into the drain line, as does the 1" drain from the filter handling table drip pan. The drain line from the drying vessel, 1/2" PL-AR-155099 is also stainless steel and is routed directly to the floor drain.

Sample lines are 1/4" SST tubing and pipe. As shown in drawings 444390, 444391, 444392, and 444393, these lines are encased in stainless steel pipe when they exit the Filter Handling Cell.

Pipe supports in the FHC are constructed of stainless steel. The new supports, shown in drawing 444390, consist of SST channel welded to the floor, with pipes attached to welded supports by SST "U" bolts.
3.2 Design

The NWCF HEPA Filter Leaching System Modifications were designed by EG&G Idaho, Inc. ETAS reviewed and evaluated the various design documents: Design criteria (Reference 1b), Feasibility Study (Reference 1a), A-E Performance Specification (Reference 1c), Stress Analysis (Reference 1e), Vessel Specification (Reference 1d), and the RCRA Part B Permit Application relevant to the existing building structure and cell lining (Reference 3). Based on the requirements and the guidelines set forth in 40 CFR 265.192 and 40 CFR 265.193, ETAS assessed the adequacy of the design of the NWCF Filter Leaching Modifications Project.

3.2.1 Regulatory Requirements

The regulatory requirements to ensure adequate design of tanks and components of hazardous waste tank systems are cited in environmental regulations 40 CFR 265.192 and 40 CFR 265.193. In general, the regulations set forth two sets of design requirements: one set pertains to the integrity of the primary systems and the other set pertains to secondary containment and leak detection. ETAS summarizes the pertinent requirements below. The regulations are included as Appendix A.

A) Information that must be considered in the design assessment of system structural integrity and acceptability for storing or treating of hazardous waste:
   a) Consideration of the design standards utilized;
   b) Hazardous characteristics of the waste;
   c) Adequacy of the tank foundations;
   d) Ancillary equipment support.
Because no part of this system is located in the ground, requirements for consideration of corrosion protection, backfill, frost heave, or vehicular traffic are not relevant.

B) Design requirements for secondary containment and detection of potential leaks:
   a) Satisfactory materials of construction must be used;
   b) Secondary containment must be structurally sound, have an adequate foundation, have at least 100% of the capacity of the largest tank, and prevent infiltration;
   c) A leak detection system to detect leaks within 24 hours;
   d) A liquid removal system and/or an adequate slope in the system to remove liquid.

2.2 Structural Integrity Assessment

Design Standards: The general design standards are set forth in the design documents (Reference 1). These include various ASME, ANSI, ASTM, ASNT, and AWS standards. These standards ensure that the construction meets the requirements of ASME/ANSI B31.3 and NQA-1 for nuclear facilities as required by the DOE Idaho under DOE-ID Order 4700.1 and DOE-ID Order 5700.6c. ETAS also reviewed the extensive requirements set forth in the A-E Performance Specification (Reference 1c).

Hazardous Waste Characteristics: Compatibility of the materials of construction (304L stainless steel) and the waste solutions (nitric acid) have been considered in the RCRA Part B permit application (Reference 3), and more extensively in "Liner Compatibility Paper," by C.L. Porter of WINCO (Reference 4). These documents and the extensive experience at the ICPP with these materials provide assurance of material compatibility.
Adequacy of Tank Foundations:

The tank foundation design was checked for adequacy by P.J. Matonis (Reference 1e). This stress analysis included the tank supports, the piping and tubing installation, and piping supports. Based on the Natural Phenomena Classification (NPC) 4D, the static analyses were performed with earthquake coefficients developed from UBC-91.

Ancillary Equipment Support: As stated above, these stainless steel supports were included in the stress analysis performed by P.J. Matonis.

Other Considerations: The vessels in this system are designed for 0.5 psig maximum. Both vessels have a substantial flow of air or steam into the vessel at times. Adequate venting of these gases is provided via pipes 2" VG-AR-1009009 and 2" VG-AR-155100. The vessel lids are not secured to the vessels, and thus provide emergency pressure relief.

3.2.3 Secondary Containment Assessment

Materials of Construction: All secondary containment is constructed of 304L stainless steel. As noted above, this material is compatible with the waste solutions in the system.

Secondary Containment: The FHC stainless steel liner has a capacity of approximately 600 gallons, much greater than the capacity of the largest tank (120 gallons). This liner was installed when the facility was constructed. Documents indicate that the liner was installed in accordance to specification SP-453504-20-2, and that the welds were nondestructively examined for leakage by vacuum box and liquid penetrant techniques in 3/79 (Reference 3).
The cell is located in building CPP-659. The foundation for the liner is the floor of the cell. The floors of the building are of reinforced concrete and were designed to handle much larger tanks than are used in the filter leaching system. Groundwater infiltration into the building is prevented by coating below grade concrete surfaces with a waterproof bitumen, asphalt, or coal tar pitch. Construction joints in external walls and floor slabs have waterstops of continuous carbon steel strip with butt welded ends and corners (Reference 3).

The ancillary piping is also contained within the Filter Handling Cell, and is therefore secondarily contained by the cell liner. Where the sample lines exit the cell, they are encased in stainless steel pipes. This double-walled pipe containment extends through the Cell Entry and into the Valve Vault. This secondary containment piping is sloped to drain to the FHC for leak detection and removal. The other two new wall penetrations for the sample piping, from the Valve Vault to the Decon Pump Cell and from the Decon Pump Cell to the Decon Holding Tank Cell, are also sleeved by stainless steel pipe. They drain into these pre-existing cells, which have secondary containment, and leak detection and removal systems (Reference 3).

**Leak Detection:** Primary leak detection is by surveillance of the system during periods of operation. In addition, a level measuring device monitors the level within the leaching vessel to prevent overfilling. This level device would also detect any unplanned loss of fluid. Any spill within the cell drains to vessels in a lower cell. These vessels also have level measuring devices which would show an unplanned increase in the event of a significant loss in the filter handling cell. These vessels, VES-NCD-123, and VES-NCD-129, are much larger than the filter leaching vessel.
Leak Removal: The floor cell slopes to a trench on the east wall, and the trench slopes south to the drain. This double-walled pipe drains to large tanks in a lower cell. This lower cell also has a stainless steel liner (Reference 3).

3.2.4 Summary of Assessment

Based on the assessment described in 3.2.2, it is ETAS's opinion that the HEPA Filter Leaching System Modifications Project is designed to provide adequate structural integrity and is acceptable for the storing and treating of hazardous waste. According to Section 3.2.3, ETAS concludes that the design for handling potential leaks in the HEPA Filter Leaching System is satisfactory.
4.0 Conditions of Attestation

ETAS reviewed the documents listed in the References Section which pertain to the design of the NWCF HEPA Filter Leaching System Modifications Project and provided assessments as detailed in Section 3.0. These assessments are the basis for this certification. Excluded from this certification are pre-existing systems not specifically included in this report.

This certification includes only the design of the system, and not the installation. A second certification document will be provided for installation after all installation activities are complete.

ETAS's interpretation of the adequacy of the design is strictly based on environmental regulatory requirements, and this certification should not be construed as a warranty of the HEPA Filter Leaching System.
REFERENCES

1. Design and Specification Documents


2. Drawings

<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Drawing Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>444385</td>
<td>Cover Sheet, Area Map and Site Map</td>
</tr>
<tr>
<td>444386</td>
<td>Drawing Index and Legends</td>
</tr>
<tr>
<td>444389</td>
<td>Process and Instrument Diagram</td>
</tr>
<tr>
<td>444390</td>
<td>Piping Plan</td>
</tr>
<tr>
<td>444391</td>
<td>Sample Lines Plan, Section and Details</td>
</tr>
<tr>
<td>444392</td>
<td>Piping Sections and Details</td>
</tr>
<tr>
<td>444393</td>
<td>Piping Sections</td>
</tr>
<tr>
<td>444394</td>
<td>Piping Details and Views</td>
</tr>
<tr>
<td>Drawing No.</td>
<td>Drawing Description</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>444397</td>
<td>VES-NCD-141 and VES-NCD-0142 Installation</td>
</tr>
<tr>
<td>444398</td>
<td>VES-NCD-141 Assembly</td>
</tr>
<tr>
<td>444399</td>
<td>VES-NCD-142 Assembly</td>
</tr>
<tr>
<td>444400</td>
<td>VES-NCD-141 Details</td>
</tr>
<tr>
<td>444401</td>
<td>Spacer Block Details</td>
</tr>
<tr>
<td>444402</td>
<td>VES-NCD-141 Lid Cover</td>
</tr>
<tr>
<td>444403</td>
<td>VES-NCD-142 Lid Cover</td>
</tr>
<tr>
<td>444404</td>
<td>Filter Handling Table Drip Pan</td>
</tr>
<tr>
<td>444405</td>
<td>Filter Handling Table Drip Pan Installation</td>
</tr>
<tr>
<td>444406</td>
<td>Work Table Lid Stand and Drain Screen</td>
</tr>
<tr>
<td>444407</td>
<td>Valve Station Details</td>
</tr>
<tr>
<td>444411</td>
<td>Filter Handling Cell Plan - Installation</td>
</tr>
</tbody>
</table>


APPENDIX A

PERTINENT ENVIRONMENTAL REGULATIONS
§ 265.192 Design and installation of new tank systems or components.

(a) Owners or operators of new tank systems or components must ensure that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection so that it will not collapse, rupture, or fail. The owner or operator must obtain a written assessment, reviewed and certified by an independent, qualified, registered professional engineer, in accordance with Section 270.11(d) attesting that the system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The assessment must include, at a minimum, the following information:

(1) Design standard(s) according to which the tank(s) and ancillary equipment is or will be constructed.
(2) Hazardous characteristics of the waste(s) to be handled.
(3) For new tank systems or components in which the external shell of a metal tank or any external metal component of the tank system is or will be in contact with the soil or with water, a determination by a corrosion expert of:
   (i) Factors affecting the potential for corrosion, including but not limited to:
       (A) Soil moisture content;
       (B) Soil pH;
       (C) Soil sulfides level;
       (D) Soil resistivity;
       (E) Structure to soil potential;
       (F) Influence of nearby underground metal structures (e.g., piping);
       (G) Stray electric current; and
       (H) Existing corrosion-protection measures (e.g., coating, cathodic protection), and
   (ii) The type and degree of external corrosion protection that are needed to ensure the integrity of the tank system during the use of the tank system or component, consisting of one or more of the following:
       (A) Corrosion-resistant materials of construction such as special alloys, fiberglass reinforced plastic;
       (B) Corrosion-resistant coating (such as epoxy, fiberglass) with cathodic protection (e.g., impressed current or sacrificial anodes); and
       (C) Electrical isolation devices such as insulating joints and flanges.

   [Note: The practices described in the National Association of Corrosion Engineers (NACE) standard, "Recommended Practice (RP 02-85) - Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems," and the American Petroleum Institute (API) Publication 1233, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems," may be used, where applicable, as guidelines in providing corrosion protection for tank systems.]

(4) For underground tank system components that are likely to be affected by vehicular traffic, a determination of design or operational measures that will protect the tank system against potential damage; and

(5) Design considerations to ensure that:
   (i) Tank foundations will maintain the load of a full tank;
   (ii) Tank systems will be anchored to prevent flotation or dislodgment where the tank system is placed in a saturated zone, or is located within a seismic fault zone; and
   (iii) Tank systems will withstand the effects of frost heave.

(b) The owner or operator of a new tank system must ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation. Prior to covering, enclosing, or placing a new tank system or component in use, an independent, qualified installation inspector or an independent, qualified, registered professional engineer, either of whom is trained and experienced in the proper installation of tank systems, must inspect the system or component for the presence of any of the following items:

(1) Weld breaks;
(2) Punctures;
(3) Scratches of protective coatings;
(4) Cracks;
(5) Corrosion;

(6) Other structural damage or inadequate construction or installation.

All discrepancies must be remedied before the tank system is covered, enclosed, or placed in use.

(c) New tank systems or components and piping that are placed underground and that are backfilled must be provided with a backfill material that is noncorrosive, porous, homogeneous substance and that is carefully installed so that the backfill is placed completely around the tank and compacted to ensure that the tank and piping are fully and uniformly supported.

(d) All new tanks and ancillary equipment must be tested for tightness prior to being covered, enclosed or placed in use. If a tank system is found not to be tight, all repairs necessary to remedy the leak(s) in the system must be performed prior to the tank system being covered, enclosed, or placed in use.

(e) Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion or contraction.

[Note: The piping system installation procedures described in American Petroleum Institute (API) Publication 1615 (November 1979), "Installation of Underground Petroleum Storage Systems," or ANSI Standard B31.3, "Petroleum Refinery Systems," and ANSI Standard B31.4 "Liquid Petroleum Transportation Piping System," may be used, where applicable, as guidelines for proper installation of piping systems.]

(f) The owner or operator must provide the type and degree of corrosion protection necessary, based on the information provided under paragraph (a)(5) of this section, to ensure the integrity of the tank system during use of the tank system. The installation of a corrosion protection system that is field fabricated must be supervised by an independent corrosion expert to ensure proper installation.

(g) The owner or operator must obtain and keep on file at the facility written statements by those persons required to certify the design of the tank system and supervise the installation of the tank system in accordance with the requirements of paragraphs (b) through (f) of this section to attest that the tank system was properly designed and installed and that repairs, pursuant to paragraphs (b) and (d) of this section, were performed. These written statements must also include the certification statement as required in Section 270.11(d) of this chapter.

[Information collection requirements contained in paragraphs (a) and (g) were approved by the Office of Management and Budget under control number 2050-0056.]

31 FR 25479, July 14, 1986, as amended at 31 FR 29430, August 15, 1986]
§ 265.193 Containment and detection of releases.

(a) In order to prevent the release of hazardous waste or hazardous constituents to the environment, secondary containment that meets the requirements of this section must be provided (except as provided in paragraphs (f) and (g) of this section):

(1) For all new tank systems or components, prior to their being put into service;

(2) For all existing tanks used to store or treat EPA Hazardous Waste Nos. F020, F021, F022, F023, F025, and F027, within two years after January 12, 1987;

(3) For those existing tank systems of known and documentable age, within two years after January 12, 1987, or when the tank systems have reached 15 years of age, whichever comes later;

(4) For those existing tank systems for which the age cannot be documented, within eight years of January 12, 1987; but if the age of the facility is greater than seven years, secondary containment must be provided by the time the facility reaches 15 years of age, or within two years of January 12, 1987, whichever comes later; and

(5) For tank systems that store or treat materials that become hazardous wastes subsequent to January 12, 1987, within the time intervals required in paragraphs (a)(1) through (a)(4) of this section, except that the date that a material becomes a hazardous waste must be used in place of January 12, 1987.

(b) Secondary containment systems must be:

(1) Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to soil, ground water, or surface water at any time during the use of the tank system; and

(2) Capable of detecting and collecting releases and accumulated liquids until the collected material is removed.

(c) To meet the requirements of paragraph (b) of this section, secondary containment systems must be at a minimum:

(1) Constructed of or lined with materials that are compatible with the waste(s) to be placed in the tank system and must have sufficient strength and thickness to prevent failure due to pressure gradients (including static head and external hydrological forces), physical contact with the waste to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation (including stressors from vehicular traffic);

(2) Placed on a foundation or base capable of providing support to the secondary containment system and resistance to pressure gradients above and below the system and capable of preventing failure due to settlement, compression, or uplift;

(3) Provided with a leak-detection system that is designed and operated so that it will detect the failure of either the primary and secondary containment structure or any release of hazardous waste or accumulated liquid in the secondary containment system within 24 hours, or at the earliest practicable time if the existing detection technology or site conditions will not allow detection of a release within 24 hours;

(4) Sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills, or precipitation. Spilled or leaked waste and accumulated precipitation must be removed from the secondary containment system within 24 hours, or in as timely a manner as is possible to prevent harm to human health or the environment, if removal of the released waste or accumulated precipitation cannot be accomplished within 24 hours.

[Note: If the collected material is a hazardous waste under Part 261 of this chapter, it is subject to management as a hazardous waste in accordance with all applicable requirements of Parts 262 through 266 of this chapter. If the collected material is discharged through a point source to waters of the United States, it is subject to the requirements of sections 301, 304, and 402 of the Clean Water Act, as amended. If discharged to a Publicly Owned Treatment Works (POTW), it is subject to the requirements of section 307 of the Clean Water Act, as amended. If the collected material is released to the environment, it may be subject to the reporting requirements of 40 CFR Part 302.]

(d) Secondary containment for tanks must include one or more of the following devices:

(1) A liner (external to the tank);

(2) A vault;

(3) A double-walled tank; or

(4) An equivalent device as approved by the Regional Administrator.
(e) In addition to the requirements of paragraphs (b), (c), and (d) of this section, secondary containment systems must satisfy the following requirements:

(1) External liner systems must be:

(i) Designed or operated to contain 100 percent of the capacity of the largest tank within its boundary;
(ii) Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the collection system has sufficient excess capacity to contain run-on or infiltration. Such additional capacity must be sufficient excess capacity to contain precipitation from a 25-year, 24-hour rainfall event.
(iii) Free of cracks or gaps; and
(iv) Designed and installed to completely surround the tank and to cover all surrounding earth likely to come into contact with the waste if released from the tank(s) (i.e., capable of preventing lateral as well as vertical migration of the waste).

(2) Vault systems must be:

(i) Designed or operated to contain 100 percent of the capacity of the largest tank within its boundary;
(ii) Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the collection system has sufficient excess capacity to contain run-on or infiltration. Such additional capacity must be sufficient to contain precipitation from a 25-year, 24-hour rainfall event;
(iii) Constructed with chemical-resistant water stops in place at all joints (if any);
(iv) Provided with an impermeable interior coating or lining that is compatible with the stored waste and that will prevent migration of waste into the concrete;
(v) Provided with a means to protect against the formation of and ignition of vapors within the vault, if the waste being stored or treated:

(A) Meets the definition of ignitable waste under Section 262.21 of this chapter; or

(B) Meets the definition of reactive waste under Section 262.21 of this chapter and may form an ignitable or explosive vapor; and

(vi) Provided with an exterior moisture barrier or be otherwise designed or operated to prevent migration of moisture into the vault if the vault is subject to hydraulic pressure.

(3) Double-walled tanks must be:

(i) Designed as an integral structure (i.e., an inner tank within an outer shell) so that any release from the inner tank is contained by the outer shell;
(ii) Protected, if constructed of metal, from both corrosion of the primary tank interior and the external surface of the outer shell; and
(iii) Provided with a built-in, continuous leak detection system capable of detecting a release within 24 hours or at the earliest practicable time, if the owner or operator can demonstrate to the Regional Administrator, and the Regional Administrator concurs, that the existing leak detection technology or site conditions will not allow detection of a release within 24 hours.

[Note: The provisions outlined in the Steel Tank Institute's (STI) "Standard for Dual Wall Underground Steel Storage Tanks" may be used as guidelines for aspects of the design of underground steel double-walled tanks.]

(f) Ancillary equipment must be provided with full secondary containment (e.g., trench, jacketing, double-walled piping) that meets the requirements of paragraphs (b) and (c) of this section except for:

(1) Aboveground piping (exclusive of flanges, joints, valves, and connections) that are visually inspected for leaks on a daily basis;
(2) Welded flanges, welded joints, and welded connections that are visually inspected for leaks on a daily basis;
(3) Sealless or magnetic coupling pumps and sealless valves, that are visually inspected for leaks on a daily basis; and
(4) Pressurized aboveground piping systems with automatic shut-off devices (e.g., excess flow check valves, flow metering shutdown devices, loss of pressure actuated shut-off devices) that are visually inspected for leaks on a daily basis.
(g) The owner or operator may obtain a variance from the requirements of this Section if the Regional Administrator finds, as a result of a demonstration by the owner or operator, either: that alternative design and operating practices, together with location characteristics, will prevent the migration of hazardous waste or hazardous constituents into the ground water or surface water at least as effectively as secondary containment during the active life of the tank system or that in the event of a release that does migrate to ground water or surface water, no substantial present or potential hazard will be posed to human health or the environment. New underground tank systems may not, per a demonstration in accordance with paragraph (g)(2) of this section, be exempted from the secondary containment requirements of this section. Application for a variance as allowed in paragraph (g) of this section does not waive compliance with the requirements of this Subpart for new tank systems.

(1) In deciding whether to grant a variance based on a demonstration of equivalent protection of ground water and surface water, the Regional Administrator will consider:

(i) The nature and quantity of the waste;
(ii) The proposed alternate design and operation;
(iii) The hydrogeologic setting of the facility, including the thickness of soils between the tank system and ground water; and
(iv) All other factors that would influence the quality and mobility of the hazardous constituents and the potential for them to migrate to ground water or surface water.

(2) In deciding whether to grant a variance based on a demonstration of no substantial present or potential hazard, the Regional Administrator will consider:

(i) The potential adverse effects on ground water, surface water, and land quality taking into account:

(A) The physical and chemical characteristics of the waste in the tank system, including its potential for migration,
(B) The hydrogeologic characteristics of the facility and surrounding land,
(C) The potential for health risks caused by human exposure to waste constituents,
(D) The potential for damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents, and
(E) The persistence and permanence of the potential adverse effects;

(ii) The potential adverse effects of a release on ground-water quality, taking into account:

(A) The quantity and quality of ground water and the direction of ground-water flow,
(B) The proximity and withdrawal rates of water in the area,
(C) The current and future uses of ground water in the area, and
(D) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;

(iii) The potential adverse effects of a release on surface water quality, taking into account:

(A) The quantity and quality of ground water and the direction of ground-water flow,
(B) The patterns of rainfall in the region,
(C) The proximity of the tank system to surface waters,
(D) The current and future uses of surface waters in the area and any water quality standards established for those surface waters, and
(E) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality; and

(iv) The potential adverse effects of a release on the land surrounding the tank system, taking into account:

(A) The patterns of rainfall in the region, and
(B) The current and future uses of the surrounding land.
(3) The owner or operator of a tank system, for which a variance from secondary containment had been granted in accordance with the requirements of paragraph (g)(1) of this section, at which a release of hazardous waste has occurred from the primary tank system but has not migrated beyond the zone of engineering control (as established in the variance), must:

(i) Comply with the requirements of Section 265.196, except paragraph (d), and

(ii) Decontaminate or remove contaminated soil to the extent necessary to:

(A) Enable the tank system, for which the variance was granted, to resume operation with the capability for the detection of and response to releases at least equivalent to the capability it had prior to the release, and

(B) Prevent the migration of hazardous waste or hazardous constituents to ground water or surface water; and

(iii) If contaminated soil cannot be removed or decontaminated in accordance with paragraph (g)(3)(ii) of this section, comply with the requirements of §265.197(b).

(4) The owner or operator of a tank system, for which a variance from secondary containment had been granted in accordance with the requirements of paragraph (g)(1) of this section, at which a release of hazardous waste has occurred from the primary tank system and has migrated beyond the zone of engineering control (as established in the variance), must:

(i) Comply with the requirements of Section 265.196(a), (b), (c), and (d); and

(ii) Prevent the migration of hazardous waste or hazardous constituents to ground water or surface water, if possible, and decontaminate or remove contaminated soil. If contaminated soil cannot be decontaminated or removed, or if ground water has been contaminated, the owner or operator must comply with the requirements of Section 265.197(b);

(iii) If repairing, replacing, or reinstalling the tank system, provide secondary containment in accordance with the requirements of paragraphs (a) through (f) of this section or reapply for a variance from secondary containment and meet the requirements for new tank systems in Section 265.192 if the tank system is replaced. The owner or operator must comply with these requirements even if contaminated soil can be decontaminated or removed, and ground water or surface water has not been contaminated.

(b) The following procedures must be followed in order to request a variance from secondary containment:

(1) The Regional Administrator must be notified in writing by the owner or operator that he intends to conduct and submit a demonstration for a variance from secondary containment as allowed in paragraph (g) of this section according to the following schedule:

(i) For existing tank systems, at least 24 months prior to the date that secondary containment must be provided in accordance with paragraph (a) of this section; and

(ii) For new tank systems, at least 30 days prior to entering into a contract for installation of the tank system.

(2) As part of the notification, the owner or operator must also submit to the Regional Administrator a description of the steps necessary to conduct the demonstration and a timetable for completing each of the steps. The demonstration must address each of the factors listed in paragraph (g)(1) or paragraph (g)(2) of this section.

(3) The demonstration for a variance must be completed and submitted to the Regional Administrator within 180 days after notifying the Regional Administrator of intent to conduct the demonstration.

(4) The Regional Administrator will inform the public, through a newspaper notice, of the availability of the demonstration for a variance. The notice shall be placed in a daily or weekly major local newspaper of general circulation and shall provide at least 30 days from the date of the notice for the public to review and comment on the demonstration for a variance. The Regional Administrator also will hold a public hearing, in response to a request or at his own discretion, whenever such a hearing might clarify one or more issues concerning the demonstration for a variance. Public notice of the hearing will be given at least 30 days prior to the date of the hearing and may be given at the same time as notice of the opportunity for the public to review and comment on the demonstration. These two notices may be combined.
HWMA/RCRA PART B PERMIT

FOR THE IDAHO NATIONAL LABORATORY

Volume 18 – Idaho Nuclear Technology and Engineering Center

APPENDIX 8

Debris Treatment Processes
Holdup and Collection Tanks
CPP-659/-1659 Storage
CPP-666 FDP Cell Container Storage and Slab Tank Storage
Other Miscellaneous Treatment Processes
RMWSF (CPP-1617) Container Storage Area

PE ASSESSMENT OF INSTALLATION OF HFLS

Effective Date: April 27, 2009
Certification Document for the
NWCF HEPA Filter Leaching System
Modifications Project

Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

Submitted To:

Lockheed Idaho Technologies Company

April 28, 1995

ETAS Corporation
8028 North Stemmons Freeway, Suite 413
Dallas, Texas 75247-3726
Tel (214) 630-6610  Fax (214) 630-7494
CERTIFICATION DOCUMENT

FOR THE

NWCF HEPA FILTER LEACHING SYSTEM MODIFICATIONS PROJECT

Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

Prepared for:

Lockheed Idaho Technologies Company
Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

April 28, 1995

ETAS Corporation
CERTIFICATION FOR THE
NWCF HEPA FILTER LEACHING SYSTEM
MODIFICATIONS PROJECT
Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

The attached report entitled "Certification Document for the NWCF HEPA Filter Leaching System Modifications Project, Idaho Chemical Processing Plant, Idaho National Engineering Laboratory, Idaho Falls, Idaho", dated April 28, 1995, serves as the basis for this certification, which follows the guidance provided under both the Federal regulation 40 CFR 264.192, 264.193, 265.192 and 265.193, and the Idaho rules, regulations and standards for hazardous waste. We attest that the system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The certification provided herein by ETAS Corporation is limited to the work set forth in the certification document.

We certify under penalty of law that this document and all attachments were prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Stanley A. Heath, Ph.D., Project/QA Manager
ETAS Corporation

T. Y. Richard Lo, P.E., Ph.D., Lead Engineer
ETAS Corporation

James S. Kilburn, P.E., Idaho Professional Engineer
ETAS Corporation

ETAS
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CERTIFICATION</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>2.0 Certification Team</td>
<td>2</td>
</tr>
<tr>
<td>3.0 Design Assessment</td>
<td>3</td>
</tr>
<tr>
<td>3.1 Description</td>
<td></td>
</tr>
<tr>
<td>3.1.1 Filter Handling Cell</td>
<td>3</td>
</tr>
<tr>
<td>3.1.2 Leaching Vessel</td>
<td>4</td>
</tr>
<tr>
<td>3.1.3 Drying Vessel</td>
<td>4</td>
</tr>
<tr>
<td>3.1.4 Filter Handling Table</td>
<td>4</td>
</tr>
<tr>
<td>3.1.5 Piping</td>
<td>5</td>
</tr>
<tr>
<td>3.2 Design</td>
<td>6</td>
</tr>
<tr>
<td>3.2.1 Regulatory Requirements</td>
<td>6</td>
</tr>
<tr>
<td>3.2.2 Structural Integrity Assessment</td>
<td>7</td>
</tr>
<tr>
<td>3.2.3 Secondary Containment Assessment</td>
<td>8</td>
</tr>
<tr>
<td>3.2.4 Summary of Assessment</td>
<td>10</td>
</tr>
<tr>
<td>3.3 Installation and Inspection</td>
<td></td>
</tr>
<tr>
<td>3.3.1 Regulatory Requirement</td>
<td></td>
</tr>
<tr>
<td>3.3.2 Inspection and Inspection Protocols</td>
<td></td>
</tr>
<tr>
<td>3.3.3 Qualifications of the Contractors</td>
<td></td>
</tr>
<tr>
<td>3.3.4 Independent Inspection</td>
<td></td>
</tr>
<tr>
<td>3.3.5 Inspection Surveillance</td>
<td></td>
</tr>
<tr>
<td>3.3.6 Summary of Assessment</td>
<td></td>
</tr>
<tr>
<td>4.0 Conditions of Attestation</td>
<td>11</td>
</tr>
</tbody>
</table>

REFERENCES

APPENDICES

Appendix A: Pertinent Environmental Regulations
Appendix B: Qualification of Contractors
Appendix C: Certification Records of Welders and Inspectors
1.0 INTRODUCTION

High efficiency particulate air (HEPA) filters used at the Idaho Chemical Processing Plant (ICPP) are stored after use in the cells where they are used. The HEPA Filter Leaching System located in the New Waste Calcining Facility (NWCF) (building CPP-659) at the ICPP was designed to leach transuranic elements and/or heavy metals from the filters so that the filters can be disposed of at the Radioactive Waste Management Complex (RWMC) (Reference 1b). The filters are leached several times with heated nitric acid, followed by water washes and hot air drying. This project modifies the existing system to better meet the disposal criteria for the filters and improve system operability. System components include a leaching vessel, a drying vessel, associated piping and instrumentation, and the Filter Handling Cell (FHC) containing the system. Waste liquids from this system drain into vessels in another cell.

The certification provided herein by ETAS is limited to the design of vessels and ancillary equipment being installed in the FHC, and the existing FHC stainless steel liner and drain line. The design of these components is assessed to ensure that the applicable standards and requirements of 40 CFR 264.192 and 265.192 and 40 CFR 264.193 and 265.193 are met. No certification of the adequacy of the design to meet the operating criteria is provided by ETAS. As the basis of this certification, this certification document provides signatures and statements of those persons providing the certification as specified in the applicable sections of the 40 CFR 264.192 and 265.192 and 40 CFR 270.11 (d).
2.0 CERTIFICATION TEAM

The ETAS certification team was composed of three qualified professionals. The Lead Engineer, Dr. T. Y. Richard Lo, is a registered professional engineer with 16 years of experience in hazardous waste and environmental engineering. He is responsible for the overall certification and attestation that under the conditions specified in this certification document the new piping system meets the requirements of 40 CFR 264 and 265. The Project Manager, Dr. Stanley A. Heath, has had 14 years experience in chemical plant operations and environmental compliance. He audited the pertinent documents to ensure veracity, for accurate and complete documentation, and for field checking that the work was well documented. Mr. James S. Kilburn is a registered Idaho professional engineer with over 40 years of engineering experience, much of it related to tank and piping systems. He reviewed the engineering design, provided other document and construction checking, and provided certification as per 40 CFR 264 and 265 and Idaho hazardous waste regulations.
3.0 DESIGN ASSESSMENT

3.1 Description

This project provides for improvements in the filter handling capabilities, more complete leaching of HEPA filter contaminants, improved filter drying, and adequate secondary containment. Operational aspects of the system are discussed in the project feasibility study (Reference 1a). Included in the modifications are a new filter leaching vessel, a new filter drying vessel, modifications to the filter handling table, and associated process, drain, and sample lines. All stainless steel materials used in this system are type 304L.

3.1.1 Filter Handling Cell

The Filter Handling Cell (FHC) houses the HEPA Filter Leaching System. The FHC is located in the Decontamination Area of the NWCF within the ICPP. The Decontamination Area consists of two adjoining cells, the Decontamination Cell and the Filter Handling Cell. The FHC is 16 by 20 feet by 19 feet high, with walls and ceiling of three foot thick reinforced concrete. The walls and floor are lined with stainless steel. A shielded window provides a view of the interior of the cell from the operating corridor (Reference 3).

Hatches located in the ceiling of the filter cell provide overhead access. Transfer of HEPA filters into the cell is done remotely using a crane to handle the filters and/or filter containers. Once in the cell, handling of the filters is done remotely using a pair of master/slave manipulators on the left and right sides of the window, an electro-mechanical PaR, and an overhead crane in the cell (Reference 3). The cell floor slopes toward a trench located on the east side of the cell and the trench slopes to the south to a drain.
The drain, where it penetrates the floor, is a double-walled pipe. The drain is routed to the decontamination hold-up tank, VES-NCD-123, or the decontamination collection tank, VES-NCD-129, located in a cell below the FHC.

3.1.2 Leaching Vessel

The leaching vessel, VES-NCD-141, is constructed of 3/8" thick 304L stainless steel, and is approximately 2'11" by 2'5" by 2'2" high, with a bottom sloping to a 1" drain line and a flat lid. Drawings 444397 and 444398 (Reference 2) show construction and design details, including the various nozzles for acid, water, and steam/air supply lines, instrument lines, and sample lines. The capacity is about 120 gallons. The vessel is equipped with a sparger in the bottom to improve leaching efficiency.

3.1.3 Drying Vessel

The drying vessel, VES-NCD-142, is constructed of 3/8" 304L stainless steel, and is approximately 2'11" by 2'5" by 1'4" high with a flat lid. The capacity is about 70 gallons. Drawings 444397 and 444399 (Reference 2) show internal and nozzle details.

3.1.4 Filter Handling Table

The filter handling table is used to hold the filters when they are not in the leaching or drying vessels. The filters are also placed on the table following leaching to allow excess liquid to drain from the filters prior to placement in the drying vessel. The existing table is constructed entirely of stainless steel with an open grating surface (Reference 1a). The table was modified to include a drip pan of 14 gauge stainless steel under the open grating to provide collection of liquid draining from the filters. The drip pan is sloped to a drain
line at the low point. A splash guard between the leaching vessel and the filter handling table prevents spills during transfer of filters from vessel to table. Details are shown in drawings 444404 and 444405 (Reference 2).

3.1.5 Piping

Hazardous waste piping being installed includes vessel drain lines, sample lines, and an overflow line. Various other lines not carrying hazardous waste include air, nitric acid, steam, and water supply lines and vent lines from the two vessels. All lines in the FHC are constructed of stainless steel.

The drain line from the leaching vessel, 1 1/2" PL-AR-109033, is welded stainless steel, and is routed directly to the floor drain. The overflow line, 1" PL-AR-109010, also ties into the drain line, as does the 1" drain from the filter handling table drip pan. The drain line from the drying vessel, 1/2" PL-AR-155099, is also stainless steel and is routed directly to the floor drain.

Sample lines are 1/4" SST tubing and pipe. As shown in drawings 444390, 444391, 444392, and 444393, these lines are encased in stainless steel pipe where they exit the Filter Handling Cell.

Pipe supports in the FHC are constructed of stainless steel. The new supports, shown in drawing 444390, consist of SST channel welded to the floor, with pipes attached to welded supports by SST "U" bolts.
3.2 Design

The NWCF HEPA Filter Leaching System Modifications were designed by EG&G Idaho, Inc. ETAS reviewed and evaluated the various design documents: Design criteria (Reference 1b), Feasibility Study (Reference 1a), A-E Performance Specification (Reference 1c), Stress Analysis (Reference 1e), Vessel Specification (Reference 1d), and the RCRA Part B Permit Application relevant to the existing building structure and cell lining (Reference 3). Based on the requirements and the guidelines set forth in 40 CFR 264.192 and 265.192 and 40 CFR 264.193 and 265.193, ETAS assessed the adequacy of the design of the NWCF Filter Leaching Modifications Project.

3.2.1 Regulatory Requirements

The regulatory requirements to ensure adequate design of tanks and components of hazardous waste tank systems are cited in environmental regulations 40 CFR 264.192 and 265.192 and 40 CFR 264.193 and 265.193. In general, the regulations set forth two sets of design requirements: one set pertains to the integrity of the primary systems and the other set pertains to secondary containment and leak detection. ETAS summarizes the pertinent requirements below. The regulations are included as Appendix A.

A) Information that must be considered in the design assessment of system structural integrity and acceptability for storing or treating of hazardous waste:
   a) Consideration of the design standards utilized;
   b) Hazardous characteristics of the waste;
   c) Adequacy of the tank foundations;
   d) Ancillary equipment support.
Because no part of this system is located in the ground, requirements for consideration of corrosion protection, backfill, frost heave, or vehicular traffic are not relevant.

B) Design requirements for secondary containment and detection of potential leaks:
   a) Satisfactory materials of construction must be used;
   b) Secondary containment must be structurally sound, have an adequate foundation, have at least 100% of the capacity of the largest tank, and prevent infiltration;
   c) A leak detection system to detect leaks within 24 hours;
   d) A liquid removal system and/or an adequate slope in the system to remove liquid.

3.2.2 Structural Integrity Assessment

Design Standards: The general design standards are set forth in the design documents (Reference 1). These include various ASME, ANSI, ASTM, ASNT, and AWS standards. These standards ensure that the construction meets the requirements of ASME/ANSI B31.3 and NQA-1 for nuclear facilities as required by the DOE Idaho under DOE-ID Order 4700.1 and DOE-ID Order 5700.6c. ETAS also reviewed the extensive requirements set forth in the A-E Performance Specification (Reference 1c).

Hazardous Waste Characteristics: Compatibility of the materials of construction (304L stainless steel) and the waste solutions (nitric acid) have been considered in the RCRA Part B permit application (Reference 3), and more extensively in "Liner Compatibility Paper," by C.L. Porter of WINCO (Reference 4). These documents and the extensive experience at the ICPP with these materials provide assurance of material compatibility.
Adequacy of Tank Foundations:

The tank foundation design was checked for adequacy by P.J. Matonis (Reference 1e). This stress analysis included the tank supports, the piping and tubing installation, and piping supports. Based on the Natural Phenomena Classification (NPC) 4D, the static analyses were performed with earthquake coefficients developed from UBC-91.

Ancillary Equipment Support: As stated above, these stainless steel supports were included in the stress analysis performed by P.J. Matonis.

Other Considerations: The vessels in this system are designed for 0.5 psig maximum. Both vessels have a substantial flow of air or steam into the vessel at times. Adequate venting of these gases is provided via pipes 2" VG-AR-1009009 and 2" VG-AR-155100. The vessel lids are not secured to the vessels, and thus provide emergency pressure relief.

3.2.3 Secondary Containment Assessment

Materials of Construction: All secondary containment is constructed of 304L stainless steel. As noted above, this material is compatible with the waste solutions in the system.

Secondary Containment: The FHC stainless steel liner has a capacity of approximately 600 gallons, much greater than the capacity of the largest tank (120 gallons). This liner was installed when the facility was constructed. Documents indicate that the liner was installed in accordance to specification SP-453504-20-2, and that the welds were nondestructively examined for leakage by vacuum box and liquid penetrant techniques in 3/79 (Reference 3). These welds were also inspected by LITCO in 1995 according to Quality Inspection Plan No. 9425-S-4 (Reference 5b) and found to be sound.
The cell is located in building CPP-659. The foundation for the liner is the floor of the cell. The floors of the building are of reinforced concrete and were designed to handle much larger tanks than are used in the filter leaching system. Groundwater infiltration into the building is prevented by coating below grade concrete surfaces with a waterproof bitumen, asphalt, or coal tar pitch. Construction joints in external walls and floor slabs have waterstops of continuous carbon steel strip with butt welded ends and corners (Reference 3).

The ancillary piping is also contained within the Filter Handling Cell, and is therefore secondarily contained by the cell liner. Where the sample lines exit the cell, they are encased in stainless steel pipes. This double-walled pipe containment extends through the Cell Entry and into the Valve Vault. This secondary containment piping is sloped to drain to the FHC for leak detection and removal. The other two new wall penetrations for the sample piping, from the Valve Vault to the Decon Pump Cell and from the Decon Pump Cell to the Decon Holding Tank Cell, are also sleeved by stainless steel pipe. They drain into these pre-existing cells, which have secondary containment, and leak detection and removal systems (Reference 3).

**Leak Detection**: Primary leak detection is by surveillance of the system during periods of operation. In addition, a level measuring device monitors the level within the leaching vessel to prevent overfilling. This level device would also detect any unplanned loss of fluid. Any spill within the cell drains to vessels in a lower cell. These vessels also have level measuring devices which would show an unplanned increase in the event of a significant loss in the filter handling cell. These vessels, VES-NCD-123, and VES-NCD-129, are much larger than the filter leaching vessel.
Leak Removal: The floor cell slopes to a trench on the east wall, and the trench slopes south to the drain. This double-walled pipe drains to large tanks in a lower cell. This lower cell also has a stainless steel liner (Reference 3).

3.2.4 Summary of Assessment

Based on the assessment described in 3.2.2, it is ETAS's opinion that the HEPA Filter Leaching System Modifications Project is designed to provide adequate structural integrity and is acceptable for the storing and treating of hazardous waste. According to Section 3.2.3, ETAS concludes that the design for handling potential leaks in the HEPA Filter Leaching System is satisfactory.

3.3 Installation and Inspection

To ensure proper installation of the system, ETAS:

1) Evaluated the adequacy of the installation and inspection protocols,

2) Reviewed the qualifications of the constructors,

3) Examined installation and inspection records, and

4) Provided surveillance of inspection and installation activities, and witnessed the results of S.O. testing.

Based on the regulatory requirements and guidelines set forth in regulation 40 CFR 264.192 and 265.192, ETAS assessed the adequacy of the installation of the HEPA Filter Leaching System Modification Project.
3.3.1 Regulatory Requirements

The applicable regulatory requirements to ensure proper installation of new tank system components are cited in 40 CFR 264.192(b) - (f) (Appendix A) and 265.192(b) - (f). These regulations require that systems be inspected to detect:

1) weld breaks;
2) punctures;
3) cracks;
4) corrosion;
5) other structural damage or inadequate construction of installation;
6) tightness testing prior to service;
7) protection against physical damage.

Sections of the regulation concerning underground installations do not apply to this project.

3.3.2 Installation and Inspection Protocols

LITCO's installation and inspection protocols are defined in various Quality Engineering Inspection Plans (Reference 5b). These protocols incorporate the quality assurance standards set forth in Quality Program Plan, QPP 332 (Reference 5a), which were developed to meet the National Quality Assurance Standards NQA-1 as required by the
DOE Idaho under DOE-ID Order 4700.1 and DOE-ID Order 5700.6c. Although the U.S. Environmental Protection Agency (USEPA) does not set any specific assurance standards for the installation and inspection of tanks and piping system, it is ETAS's professional judgment that the NQA-1 standard will ensure that the designs discussed in Sections 3.2.2 and 3.2.3 are properly installed and meet the requirements of 40 CFR 264.192 and 265.192.

ETAS assessed LITCO's installation and inspection protocols (Reference 5b), which include vessel construction, installation of piping and vessels, receipt of materials, and welding. These plans were reviewed and approved by LITCO's Project Engineer, Mr. T.H. Waite. Based on this assessment, ETAS concludes that LITCO's installation and inspection protocols are adequate.

3.3.3 Qualifications of the Contractors

Construction management of all installations was provided by Lockheed Idaho Technologies Company, a construction management company approved by the Department of Energy (DOE). Dynamics Incorporated was the general and mechanical contractor, and was responsible for proper completion of all work. Based on the qualifications of this company (Appendix B) and a review of the certification records of the welders (Appendix C), ETAS concludes that the installation was performed by a qualified contractor.
3.3.4 Independent Inspection

To ensure that the installation was implemented in accordance with the installation and inspection protocols set forth in section 3.3.2, LITCO assigned their own Quality Control Engineers and Inspectors overall responsibility for inspection. ETAS’s Quality Assurance Manager, Stanley Heath, examined LITCO’s inspection records (Reference 5b), LITCO’s inspector qualifications (Appendix C), observed various inspection activities (see section 3.3.5), and concluded that the inspections were done in accordance with the inspection plans.

3.3.5 Inspection Surveillance

Dr. Stanley A. Heath, ETAS’s Quality Assurance Manager, observed various aspects of the construction and quality assurance inspection of the “NWCF HEPA Filter Leaching System Modifications Project”. On January 10, 1995, he reviewed weld records for off-site piping at Dynamics Inc. shop, on-site weld records, and observed construction in progress in the cell. On March 28, 1995, he observed the S.O. test, including the transfer of a filter from the leaching vessel to the filter handling table.
3.3.6 Summary of Assessment

ETAS reviewed the installation and inspection protocols; reviewed the qualifications of contractors, welders and inspectors; examined pertinent inspection records; witnessed various construction and quality assurance activities; reviewed the S.O. test plan; and witnessed the S.O. test. ETAS concludes that the installation and inspection protocols were adequate and were implemented satisfactorily. Based on this assessment, ETAS concludes that the "NWCF HEPA Filter Leaching System Modifications Project" was installed properly and meets the regulatory requirements of 40 CFR 264.192, 264.193, 265.192 and 265.193.
4.0 Conditions of Attestation

ETAS reviewed the documents listed in the References Section which pertain to the design and installation of the NWCF HEPA Filter Leaching System Modifications Project and provided assessments as detailed in Section 3.0. These assessments are the basis for this certification. Excluded from this certification are pre-existing systems not specifically included in this report.

ETAS's interpretation of the adequacy of the design and installation is strictly based on environmental regulatory requirements, and this certification should not be construed as a warranty of the HEPA Filter Leaching System.
REFERENCES

1. Design and Specification Documents
   g) "CID Number 10 - Filter Leach System Mods", by T. Waite, October 18, 1994.

2. Drawings

<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Drawing Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>444385</td>
<td>Cover Sheet, Area Map and Site Map</td>
</tr>
<tr>
<td>444386</td>
<td>Drawing Index and Legends</td>
</tr>
<tr>
<td>444389</td>
<td>Process and Instrument Diagram</td>
</tr>
<tr>
<td>444390</td>
<td>Piping Plan</td>
</tr>
<tr>
<td>444391</td>
<td>Sample Lines Plan, Section and Details</td>
</tr>
<tr>
<td>444392</td>
<td>Piping Sections and Details</td>
</tr>
<tr>
<td>444393</td>
<td>Piping Sections</td>
</tr>
<tr>
<td>444394</td>
<td>Piping Details and Views</td>
</tr>
</tbody>
</table>


5. Quality Assurance Documents
   a) "QPP 332, Quality Program Plan for the Spent Filter Handling Project", by W.A. Waterson, March 9, 1992.
b) Quality Inspection Plans

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9425-P-1</td>
<td>Piping Inspection - Normal/Basic Service</td>
</tr>
<tr>
<td>9425-P-4</td>
<td>Drip Pan</td>
</tr>
<tr>
<td>9425-P-5</td>
<td>Piping Inspection - Normal/Basic Service - Off-site</td>
</tr>
<tr>
<td>9425-P-6</td>
<td>Vessel Inspection - (141) Piping</td>
</tr>
<tr>
<td>9425-P-7</td>
<td>Vessel (141)</td>
</tr>
<tr>
<td>9425-S-1</td>
<td>Structural Weld Inspection</td>
</tr>
<tr>
<td>9425-S-2</td>
<td>Drip Plan (off-site)</td>
</tr>
<tr>
<td>9425-S-3</td>
<td>Structural Weld Inspection (off-site)</td>
</tr>
<tr>
<td>9425-S-4</td>
<td>Weld Inspection in the Filter Handling Cell - Floor Liner</td>
</tr>
<tr>
<td>9425-R-2</td>
<td>Receipt Inspection - Off-site</td>
</tr>
</tbody>
</table>

Appendix A

Pertinent Environmental Regulations
§ 264.191 Assessment of existing tank system's integrity.

(a) For each existing tank system that does not have secondary containment meeting the requirements of § 264.193, the owner or operator must determine that the tank system is not leaking or is unfit for use. Except as provided in paragraph (c) of this section, the owner or operator must obtain and keep on file at the facility a written assessment reviewed and certified by an independent, qualified registered professional engineer, in accordance with § 270.11(d), that attests to the tank system's integrity by January 12, 1988.

(b) This assessment must determine that the tank system is adequately designed and has sufficient structural strength and compatibility with the waste(s) to be stored or treated, to ensure that it will not collapse, rupture, or fail. At a minimum, this assessment must consider the following:

1. Design standard(s), if available, according to which the tank and ancillary equipment were constructed;
2. Hazardous characteristics of the waste(s) that have been and will be handled;
3. Existing corrosion protection measures;
4. Documented age of the tank system, if available (otherwise, an estimate of the age); and
5. Results of a leak test, internal inspection, or other tank integrity examination such as:
   (i) For non-enterable underground tanks, the assessment must include a leak test that is capable of taking into account the effects of temperature variations, tank end deflection, vapor pockets, and high water table effects, and
   (ii) For other than non-enterable underground tanks and for ancillary equipment, this assessment must include either a leak test, as described above, or other integrity examination, that is certified by an independent, qualified, registered professional engineer in accordance with § 270.11(d), that addresses cracks, leaks, corrosion, and erosion.

(Note: The practices described in the American Petroleum Institute (API) Publication, Guide for Inspection of Refinery Equipment, Chapter XIII, "Atmospheric and Low-Pressure Storage Tanks," 4th edition, 1981, may be used, when applicable, as guidelines in conducting other than a leak test.)

(c) Tank systems that store or treat materials that become hazardous wastes subsequent to July 14, 1986, must conduct this assessment within 12 months after the date that the waste becomes a hazardous waste.

(d) If, as a result of the assessment conducted in accordance with paragraph (a), a tank system is found to be leaking or unfit for use, the owner or operator must comply with the requirements of § 264.196.

[57 FR 25472, July 14, 1992, as amended at 57 FR 29430, Aug. 15, 1992]

§ 264.192 Design and installation of new tank systems or components.

(a) Owners or operators of new tank systems or components must obtain and submit to the Regional Administrator, at time of submittal of Part B information, a written assessment, reviewed and certified by an independent, qualified registered professional engineer, in accordance with § 270.11(d), attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail. This assessment, which will be used by the Regional Administrator to review and approve or disapprove the acceptability of the tank system design, must include, at a minimum, the following information:

1. Design standard(s) according to which tank(s) and/or the ancillary equipment are constructed;
2. Hazardous characteristics of the waste(s) to be handled;
3. For new tank systems or components in which the external shell of a metal tank or any external metal component of the tank system will be in contact with the soil or with water, a determination by a corrosion expert of:
   (i) Factors affecting the potential for corrosion, including but not limited to:
   (A) Soil moisture content;
   (B) Soil pH;
   (C) Soil sulfides level;
   (D) Soil resistivity;
   (E) Structure to soil potential;
(F) Influence of nearby underground metal structures (e.g., piping);

(G) Existence of stray electric current;

(H) Existing corrosion-protection measures (e.g., coating, cathodic protection), and

(ii) The type and degree of external corrosion protection that are needed to ensure the integrity of the tank system during the use of the tank system or component, consisting of one or more of the following:

(A) Corrosion-resistant materials of construction such as special alloys, fiberglass reinforced plastic, etc.;

(B) Corrosion-resistant coating (such as epoxy, fiberglass, etc.) with cathodic protection (e.g., impressed current or sacrificial anodes); and

(C) Electrical isolation devices such as insulating joints, flanges, etc.

[Note: The practices described in the National Association of Corrosion Engineers (NACE) standard, “Recommended Practice (RP-02–B3)—Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems,” and the American Petroleum Institute (API) Publication 1632, “Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems,” may be used, where applicable, as guidelines in providing corrosion protection for tank systems.]

(4) For underground tank system components that are likely to be adversely affected by vehicular traffic, a determination of design or operational measures that will protect the tank system against potential damage; and

(5) Design considerations to ensure that:

(i) Tank foundations will maintain the load of a full tank;

(ii) Tank systems will be anchored to prevent flotation or dislodgment where the tank system is placed in a saturated zone, or is located within a seismic fault zone subject to the standards of § 264.18(a); and

(iii) Tank systems will withstand the effects of frost heave.

(b) The owner or operator of a new tank system must ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation. Prior to covering, enclosing, or placing a new tank system or component in use, an independent, qualified installation inspector or an independent, qualified, registered professional engineer, either of whom is trained and experienced in the proper installation of tank systems or components, must inspect the system for the presence of any of the following items:

(1) Weld breaks;

(2) Punctures;

(3) Scrapes of protective coatings;

(4) Cracks;

(5) Corrosion;

(6) Other structural damage or inadequate construction/installation.

All discrepancies must be remedied before the tank system is covered, enclosed, or placed in use.

(c) New tank systems or components that are placed underground and that are backfilled must be provided with a backfill material that is a noncorrosive, porous, homogeneous substance and that is installed so that the backfill is placed completely around the tank and compacted to ensure that the tank and piping are fully and uniformly supported.

(d) All new tanks and ancillary equipment must be tested for tightness prior to being covered, enclosed, or placed in use. If a tank system is found not to be tight, all repairs necessary to remedy the leak(s) in the system must be performed prior to the tank system being covered, enclosed, or placed into use.

(e) Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.


(f) The owner or operator must provide the type and degree of corrosion protection recommended by an independent corrosion expert, based on the information provided under paragraph (a)(3) of this section, or other corrosion protection if the Regional Administrator believes other corrosion protection is necessary to ensure the integrity of the tank system during use of the tank system. The installation of a corrosion protection system that is field fabricated must be supervised by an independent corrosion protection engineer to ensure proper installation.
§ 264.193 TSD FACILITY STANDARDS

(g) The owner or operator must obtain and keep on file at the facility written statements by those persons required to certify the design of the tank system and supervise the installation of the tank system in accordance with the requirements of paragraphs (b) through (f) of this section, that attest that the tank system was properly designed and installed and that repairs, pursuant to paragraphs (b) and (d) of this section, were performed. These written statements must also include the certification statement as required in § 270.11(d) of this Chapter.


§ 264.193 Containment and detection of releases.

(a) In order to prevent the release of hazardous waste or hazardous constituents to the environment, secondary containment that meets the requirements of this section must be provided (except as provided in paragraphs (f) and (g) of this section):

1. For all new tank systems or components, prior to their being put into service;

2. For all existing tank systems used to store or treat EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027, within two years after January 12, 1987;

3. For those existing tank systems of known and documented age, within two years after January 12, 1987 or when the tank system has reached 15 years of age, whichever comes later;

4. For those existing tank systems for which the age cannot be documented, within eight years of January 12, 1987; but if the age of the facility is greater than seven years, secondary containment must be provided by the time the facility reaches 15 years of age, or within two years of January 12, 1987, whichever comes later, and

5. For tank systems that store or treat materials that become hazardous wastes subsequent to January 12, 1987, within the time intervals required in paragraphs (a)(1) through (a)(4) of this section, except that the date that a material becomes a hazardous waste must be used in place of January 12, 1987.

(b) Secondary containment systems must be:

1. Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, ground water, or surface water at any time during the use of the tank system; and

2. Capable of detecting and collecting releases and accumulated liquids until the collected material is removed.

(c) To meet the requirements of paragraph (b) of this section, secondary containment systems must be at a minimum:

1. Constructed of or lined with materials that are compatible with the waste(s) to be placed in the tank system and must have sufficient strength and thickness to prevent failure owing to pressure gradients (including static head and external hydrological forces), physical contact with the waste to which it is exposed, climatic conditions, and the stress of daily operation (including stresses from nearby vehicular traffic).

2. Placed on a foundation or base capable of providing support to the secondary containment system, resistance to pressure gradients above and below the system, and capable of preventing failure due to settlement, compression, or uplift;

3. Provided with a leak-detection system that is designed and operated so that it will detect the failure of either the primary or secondary containment structure or the presence of any release of hazardous waste or accumulated liquid in the secondary containment system within 24 hours, or at the earliest practicable time if the owner or operator can demonstrate to the Regional Administrator that existing detection technologies or site conditions will not allow detection of a release within 24 hours; and

4. Sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills, or precipitation. Spilled or leaked waste and accumulated precipitation must be removed from the secondary containment system within 24 hours, or in as timely a manner as is possible to prevent harm to human health and the environment, if the owner or operator can demonstrate to the Regional Administrator that removal of the released waste or accumulated precipitation cannot be accomplished within 24 hours.

[Note: If the collected material is a hazardous waste under Part 261 of this chapter, it is subject to management as a hazardous waste in accordance with all applicable requirements of Part 262 through 265 of this chapter. If the collected material is discharged through a point source to waters of the United States, it is subject to the requirements of sections 301, 304, and 402 of the Clean Water Act, as amended. If discharged to a Publicly Owned Treatment Works (POTW), it is subject to the requirements of section 307 of the Clean Water Act, as amended. If the collected material is released to the environment, it may be subject to the reporting requirements of 40 CFR Part 302.]

(d) Secondary containment for tanks must include one or more of the following devices:
TSD FACILITY STANDARDS

§ 264.193

A liner (external to the tank);
A vault;
(3) A double-walled tank; or
(4) An equivalent device as approved by the Regional Administrator.

(e) In addition to the requirements of paragraphs (b), (c), and (d) of this section, secondary containment systems must satisfy the following requirements:

(1) External liner systems must be:
   (i) Designed or operated to contain 100 percent of the capacity of the largest tank within its boundary;
   (ii) Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the collection system has sufficient excess capacity to contain run-on or infiltration. Such additional capacity must be sufficient to contain precipitation from a 25-year, 24-hour rainfall event.
   (iii) Free of cracks or gaps; and
   (iv) Designed and installed to surround the tank completely and to cover all surrounding earth likely to come into contact with the waste if the waste is released from the tank(s) (i.e., capable of preventing lateral as well as vertical migration of the waste).

(2) Vault systems must be:
   (i) Designed or operated to contain 100 percent of the capacity of the largest tank within its boundary;
   (ii) Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the collection system has sufficient excess capacity to contain run-on or infiltration. Such additional capacity must be sufficient to contain precipitation from a 25-year, 24-hour rainfall event;
   (iii) Constructed with chemical-resistant water stops in place at all joints (if any);
   (iv) Provided with an impermeable interior coating or lining that is compatible with the stored waste and that will prevent migration of waste into the concrete;
   (v) Provided with a means to protect against the formation of and ignition of vapors within the vault, if the waste being stored or treated:
      (A) Meets the definition of ignitable waste under § 262.21 of this chapter; or
      (B) Meets the definition of reactive waste under § 262.21 of this chapter, and may form an ignitable or explosive vapor.
   (vi) Provided with an exterior moisture barrier or be otherwise designed or operated to prevent migration of moisture into the vault if the vault is subject to hydraulic pressure.

(3) Double-walled tanks must be:
   (i) Designed as an integral structure (i.e., an inner tank completely enveloped within an outer shell) so that any release from the inner tank is contained by the outer shell.
   (ii) Protected, if constructed of metal, from both corrosion of the primary tank interior and of the external surface of the outer shell; and
   (iii) Provided with a built-in continuous leak detection system capable of detecting a release within 24 hours, or at the earliest practicable time, if the owner or operator can demonstrate to the Regional Administrator, and the Regional Administrator concludes, that the existing detection technology or site conditions would not allow detection of a release within 24 hours.

[Note: The provisions outlined in the Steel Tank Institute’s (STI) “Standard for Dual Wall Underground Steel Storage Tanks” may be used as guidelines for aspects of the design of underground steel double-walled tanks.]

(f) Ancillary equipment must be provided with secondary containment (e.g., trench, jacketing, double-walled piping) that meets the requirements of paragraphs (b) and (c) of this section except for:

(1) Aboveground piping (exclusive of flanges, joints, valves, and other connections) that are visually inspected for leaks on a daily basis;
(2) Welded flanges, welded joints, and welded connections, that are visually inspected for leaks on a daily basis;
(3) Sealsless or magnetic coupling pumps and sealless valves, that are visually inspected for leaks on a daily basis; and
(g) The owner or operator may obtain a variance from the requirements of this section if the Regional Administrator finds, as a result of a demonstration by the owner or operator that alternative design and operating practices, together with location characteristics, will prevent the migration of any hazardous waste or hazardous constituents into the ground water or surface water at least as effectively as secondary containment during the active life of the tank system or that in the event of a release that does migrate to ground water or surface water, no substantial present or potential hazard will be posed to human health or the environment. New underground tank systems may not, per a demonstration in accordance with paragraph (g)(2) of this section, be exempted from the secondary containment requirements of this section.

(1) In deciding whether to grant a variance based on a demonstration of equivalent protection of ground water and surface water, the Regional Administrator will consider:

(i) The nature and quantity of the wastes;
(ii) The proposed alternate design and operation;
(iii) The hydrogeologic setting of the facility, including the thickness of soils present between the tank system and ground water, and
(iv) All other factors that would influence the quality and mobility of the hazardous constituents and the potential for them to migrate to ground water or surface water.

(2) In deciding whether to grant a variance based on a demonstration of no substantial present or potential hazard, the Regional Administrator will consider:

(i) The potential adverse effects on ground water, surface water, and land quality taking into account:
   (A) The physical and chemical characteristics of the waste in the tank system, including its potential for migration,
   (B) The hydrogeological characteristics of the facility and surrounding land,
   (C) The potential for health risks caused by human exposure to waste constituents,
   (D) The potential for damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents, and
   (E) The persistence and permanence of the potential adverse effects;

(ii) The potential adverse effects of a release on ground-water quality, taking into account:
   (A) The quantity and quality of ground water and the direction of ground-water flow,
   (B) The proximity and withdrawal rates of ground-water users,
   (C) The current and future uses of ground water in the area, and
   (D) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;

(iii) The potential adverse effects of a release on surface water quality, taking into account:
   (A) The quantity and quality of ground water and the direction of ground-water flow,
   (B) The patterns of rainfall in the region,
   (C) The proximity of the tank system to surface waters,
   (D) The current and future uses of surface waters in the area and any water quality standards established for those surface waters, and
   (E) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality; and

(iv) The potential adverse effects of a release on the land surrounding the tank system, taking into account:
   (A) The patterns of rainfall in the region, and
   (B) The current and future uses of the surrounding land.

(3) The owner or operator of a tank system, for which a variance from secondary containment had been granted in accordance with the requirements of paragraph (g)(1) of this section, at which a release of hazardous waste has occurred from the primary tank system but has not migrated beyond the zone of engineering control (as established in the variance), must

(i) Comply with the requirements of § 264.196, except paragraph (d), and
(ii) Decontaminate or remove contaminated soil to the extent necessary to:

(A) Enable the tank system for which the variance was granted to resume operation with the capability for the detection of releases at least equivalent to the capability it had prior to the release; and

(B) Prevent the migration of hazardous waste or hazardous constituents to ground water or surface water; and

(iii) If contaminated soil cannot be removed or decontaminated in accordance with paragraph (g)(3)(ii) of this section, comply with the requirement of § 264.197(b).

(4) The owner or operator of a tank system, for which a variance from secondary containment had been granted in accordance with the requirements of paragraph (g)(1) of this section, at which a release of hazardous waste has occurred from the primary tank system and has migrated beyond the zone of engineering control (as established in the variance), must:

(i) Comply with the requirements of § 264.196(a), (b), (c), and (d); and

(ii) Prevent the migration of hazardous waste or hazardous constituents to ground water or surface water, if possible, and decontaminate or remove contaminated soil. If contaminated soil cannot be decontaminated or removed or if ground water has been contaminated, the owner or operator must comply with the requirements of § 264.197(b); and

(iii) If repairing, replacing, or reinstalling the tank system, provide secondary containment in accordance with the requirements of paragraphs (a) through (f) of this section or reapply for a variance from secondary containment and meet the requirements for new tank systems in § 264.192 if the tank system is replaced. The owner or operator must comply with these requirements even if contaminated soil can be decontaminated or removed and ground water or surface water has not been contaminated.

(h) The following procedures must be followed in order to request a variance from secondary containment:

(1) The Regional Administrator must be notified in writing by the owner or operator that he intends to conduct and submit a demonstration for a variance from secondary containment as allowed in paragraph (g) according to the following schedule:

(i) For existing tank systems, at least 24 months prior to the date that secondary containment must be provided in accordance with paragraph (a) of this section.

(ii) For new tank systems, at least 30 days prior to entering into a contract for installation.

(2) As part of the notification, the owner or operator must also submit to the Regional Administrator a description of the steps necessary to conduct the demonstration and a timetable for completing each of the steps. The demonstration must address each of the factors listed in paragraph (g)(1) or paragraph (g)(2) of this section;

(3) The demonstration for a variance must be completed within 180 days after notifying the Regional Administrator of an intent to conduct the demonstration; and

(4) If a variance is granted under this paragraph, the Regional Administrator will require the permittee to construct and operate the tank system in the manner that was demonstrated to meet the requirements for the variance.

(i) All tank systems, until such time as secondary containment that meets the requirements of this section is provided, must comply with the following:

(1) For non-enterable underground tanks, a leak test that meets the requirements of § 264.191(b)(5) or other tank integrity method, as approved or required by the Regional Administrator, must be conducted at least annually.

(2) For other than non-enterable underground tanks, the owner or operator must either conduct a leak test as in paragraph (i)(1) of this section or develop a schedule and procedure for an assessment of the overall condition of the tank system by an independent, qualified registered professional engineer. The schedule and procedure must be adequate to detect obvious cracks, leaks, and corrosion or erosion that may lead to cracks and leaks. The owner or operator must remove the stored waste from the tank, if necessary, to allow the condition of all internal tank surfaces to be assessed. The frequency of these assessments must be based on the material of construction of the tank and its ancillary equipment, the age of the system, the type of corrosion or erosion protection used, the rate of corrosion or erosion observed during the previous inspection, and the characteristics of the waste being stored or treated.

(3) For ancillary equipment, a leak test or other integrity assessment as approved by the Regional Administrator must be conducted at least annually.

[Note: The practices described in the American Petroleum Institute (API) Publication Guide for Inspection of Refinery Equipment, Chapter XIII, "Atmospheric and Low-Pressure Storage Tanks," 4th edition, 1981, may be used, where applicable, as guidelines for assessing the overall condition of the tank system.]
§ 264.194 TSD FACILITY STANDARDS

(4) The owner or operator must maintain on file at the facility a record of the results of the assessments conducted in accordance with paragraphs (i)(1) through (i)(3) of this section.

(5) If a tank system or component is found to be leaking or unfit for use as a result of the leak test or assessment in paragraphs (i)(1) through (i)(3) of this section, the owner or operator must comply with the requirements of § 264.196.


§ 264.194 General operating requirements.

(a) Hazardous wastes or treatment reagents must not be placed in a tank system if they could cause the tank, its ancillary equipment, or the containment system to rupture, leak, corrode, or otherwise fail.

(b) The owner or operator must use appropriate controls and practices to prevent spills and overflows from tank or containment systems. These include at a minimum:

(1) Spill prevention controls (e.g., check valves, dry disconnect couplings);

(2) Overfill prevention controls (e.g., level sensing devices, high level alarms, automatic feed cutoff, or bypass to a standby tank); and

(3) Maintenance of sufficient freeboard in uncovered tanks to prevent overtopping by wave or wind action or by precipitation.

(c) The owner or operator must comply with the requirements of § 264.196 if a leak or spill occurs in the tank system.

§ 264.195 Inspections.

(a) The owner or operator must develop and follow a schedule and procedure for inspecting overfill controls.

(b) The owner or operator must inspect at least once each operating day:

(1) Aboveground portions of the tank system, if any, to detect corrosion or releases of waste;

(2) Data gathered from monitoring and leak detection equipment (e.g., pressure or temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design; and

(3) The construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system (e.g., dikes) to detect erosion or signs of releases of hazardous waste (e.g., wet spots, dead vegetation).

[Note: Section 264.19(c) requires the owner or operator to remedy any deterioration or malfunction he finds. Section 264.196 requires the owner or operator to notify the Regional Administrator within 24 hours of confirming a leak. Also, 40 CFR Part 302 may require the owner or operator to notify the National Response Center of a release.]

(c) The owner or operator must inspect cathodic protection systems, if present, according to, at a minimum, the following schedule to ensure that they are functioning properly:

(1) The proper operation of the cathodic protection system must be confirmed within six months after initial installation and annually thereafter; and

(2) All sources of impressed current must be inspected and/or tested, as appropriate, at least bimonthly (i.e., every other month).

[Note: The practices described in the National Association of Corrosion Engineers (NACE) standard, "Recommended Practice (RP-02-85)—Control of External Corrosion on Metallic Bured, Partially Buried, or Submerged Liquid Storage Systems," and the American Petroleum Institute (API) Publication 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems," may be used where applicable, as guidelines in maintaining and inspecting cathodic protection systems.]

(d) The owner or operator must document in the operating record of the facility an inspection of those items in paragraphs (a) through (c) of this section.
§ 265.192 Design and installation of new tank systems or components.

(a) Owners or operators of new tank systems or components must ensure that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection so that it will not collapse, rupture, or fail. The owner or operator must obtain a written assessment, reviewed and certified by an independent, qualified, registered professional engineer, in accordance with § 270.11(d) attesting that the system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The assessment must include, at a minimum, the following information:

(1) Design standard(s) according to which the tank(s) and ancillary equipment is or will be constructed.

(2) Hazardous characteristics of the waste(s) to be handled.

(3) For new tank systems or components in which the external shell of a metal tank or any external metal component of the tank system is or will be in contact with the soil or with water, a determination by a corrosion expert of:

   (i) Factors affecting the potential for corrosion, including but not limited to:

      (A) Soil moisture content;
      (B) Soil pH;
      (C) Soil sulfides level;
      (D) Soil resistivity;
      (E) Structure to soil potential;
      (F) Influence of nearby underground metal structures (e.g., piping);
      (G) Stray electric current; and
      (H) Existing corrosion-protection measures (e.g., coating, cathodic protection), and

   (ii) The type and degree of external corrosion protection that are needed to ensure the integrity of the tank system during the use of the tank system or component, consisting of one or more of the following:

      (A) Corrosion-resistant materials of construction such as special alloys, fiberglass reinforced plastic;
      (B) Corrosion-resistant coating (such as epoxy, fiberglass) with cathodic protection (e.g., impressed current or sacrificial anodes); and
      (C) Electrical isolation devices such as insulating joints and flanges.

[Note: The practices described in the National Association of Corrosion Engineers (NACE) standard, "Recommended Practice (RP-02-85)—Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems," and the American Petroleum Institute (API) Publication 1322, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems," may be used, where applicable, as guidelines in providing corrosion protection for tank systems.]

(4) For underground tank system components that are likely to be affected by vehicular traffic, a determination of design or operational measures that will protect the tank system against potential damage; and

(5) Design considerations to ensure that:

   (i) Tank foundations will maintain the load of a full tank;
   (ii) Tank systems will be anchored to prevent flotation or dislodgment where the tank system is placed in a saturated zone, or is located within a seismic fault zone; and
   (iii) Tank systems will withstand the effects of frost heave.

(b) The owner or operator of a new tank system must ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation. Prior to covering, enclosing, or placing a new tank system or component in use, an independent, qualified installation inspector or an independent, qualified, registered professional engineer, either of whom is trained and experienced in the proper installation of tank systems, must inspect the system or component for the presence of any of the following items:

   (1) Weld breaks;
   (2) Punctures;
   (3) Scratches of protective coatings;
   (4) Cracks;
(5) Corrosion;

(6) Other structural damage or inadequate construction or installation.

Discrepancies must be remedied before the tank system is covered, enclosed, or placed in use.

New tank systems or components and piping that are placed underground and that are backfilled must be provided with a backfill material that is a noncorrosive, porous, homogeneous substance and that is carefully installed so that the backfill is placed completely around the tank and compacted to ensure that the tank and piping are fully and uniformly supported.

(d) All new tanks and ancillary equipment must be tested for tightness prior to being covered, enclosed or placed in use. If a tank system is found not to be tight, all repairs necessary to remedy the leak(s) in the system must be performed prior to the tank system being covered, enclosed, or placed in use.

(c) Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion or contraction.


(f) The owner or operator must provide the type and degree of corrosion protection necessary, based on the information provided under paragraph (e)(3) of this section, to ensure the integrity of the tank system during use of the tank system. The installation of a corrosion protection system that is field fabricated must be supervised by an independent corrosion expert to ensure proper installation.

(g) The owner or operator must obtain and keep on file at the facility written statements by those persons required to certify the design of the tank system and supervise the installation of the tank system in accordance with the requirements of paragraphs (b) through (f) of this section to attest that the tank system was properly designed and installed and that repairs, pursuant to paragraphs (b) and (d) of this section, were performed. These written statements must also include the certification statement as required in §270.11(d) of this chapter.

[51 FR 25479, July 14, 1986, as amended at 51 FR 29430, August 15, 1986]

65.193 Containment and detection of releases.

In order to prevent the release of hazardous waste or hazardous constituents to the environment, secondary containment must meet the requirements of this section.

(a) For all new tank systems or components, prior to their being put into service;

(b) For all existing tanks used to store or treat EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027, within two years after January 12, 1987;

(c) For those existing tank systems of known and documentable age, within two years after January 12, 1987, or when the tank systems have reached 15 years of age, whichever comes later;

(d) For those existing tank systems for which the age cannot be documented, within eight years of January 12, 1987; but if the age of the facility is greater than seven years, secondary containment must be provided by the time the facility reaches 15 years of age, or within two years of January 12, 1987, whichever comes later; and

(e) For tank systems that store or treat materials that become hazardous wastes subsequent to January 12, 1987, within the time intervals required in paragraphs (a)(1) through (a)(4) of this section, except that the date that a material becomes a hazardous waste must be used in place of January 12, 1987.

(b) Secondary containment systems must:

(1) Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, ground water, or surface water at any time during the use of the tank system; and

(2) Capable of detecting and collecting releases and accumulated liquids until the collected material is removed.

(c) To meet the requirements of paragraph (b) of this section, secondary containment systems must be at a minimum:

(1) Constructed or lined with materials that are compatible with the waste(s) to be placed in the tank system and must have sufficient strength and thickness to prevent failure due to pressure gradients (including static head and external hydrological forces), physical contact with the waste to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation (including stresses from nearby vehicular traffic);

©1994 by Elsevier Science Inc.
(2) Placed on a foundation or base capable of providing support to the secondary containment system and resistance to pressure gradients above and below the system and capable of preventing failure due to settlement, compression, or uplift;

(3) Provided with a leak-detection system that is designed and operated so that it will detect the failure of either the primary and secondary containment structure or any release of hazardous waste or accumulated liquid in the secondary containment system within 24 hours, or at the earliest practicable time if the existing detection technology or site conditions will not allow detection of a release within 24 hours;

(4) Sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills, or precipitation. Spilled or leaked waste and accumulated precipitation must be removed from the secondary containment system within 24 hours, or in as timely a manner as is possible to prevent harm to human health or the environment, if removal of the released waste or accumulated precipitation cannot be accomplished within 24 hours.

(Note: If the collected material is a hazardous waste under Part 261 of this chapter, it is subject to management as a hazardous waste in accordance with all applicable requirements of Parts 262 through 265 of this chapter. If the collected material is discharged through a point source to waters of the United States, it is subject to the requirements of sections 301, 304, and 402 of the Clean Water Act, as amended. If discharged to a Publicly Owned Treatment Works (POTW), it is subject to the requirements of section 307 of the Clean Water Act, as amended. If the collected material is released to the environment, it may be subject to the reporting requirements of 40 CFR Part 302.)

(d) Secondary containment for tanks must include one or more of the following devices:

   (1) A liner (external to the tank);
   (2) A vault;
   (3) A double-walled tank; or
   (4) An equivalent device as approved by the Regional Administrator.

(e) In addition to the requirements of paragraphs (b), (c), and (d) of this section, secondary containment systems must satisfy the following requirements:

   (1) External liner systems must be:

      (i) Designed or operated to contain 100 percent of the capacity of the largest tank within its boundary;

      (ii) Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the collection system has sufficient excess capacity to contain run-on or infiltration. Such additional capacity must be sufficient excess capacity to contain precipitation from a 25-year, 24-hour rainfall event.

      (iii) Free of cracks or gaps; and

      (iv) Designed and installed to completely surround the tank and to cover all surrounding earth likely to come into contact with the waste if released from the tank(s) (i.e., capable of preventing lateral as well as vertical migration of the waste).

   (2) Vault systems must be:

      (i) Designed or operated to contain 100 percent of the capacity of the largest tank within its boundary;

      (ii) Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the collection system has sufficient excess capacity to contain run-on or infiltration. Such additional capacity must be sufficient to contain precipitation from a 25-year, 24-hour rainfall event;

      (iii) Constructed with chemical-resistant water stops in place at all joints (if any);

      (iv) Provided with an impermeable interior coating or lining that is compatible with the stored waste and that will prevent migration of waste into the concrete;

      (v) Provided with a means to protect against the formation of and ignition of vapors within the vault, if the waste being stored or treated:

         (A) Meets the definition of ignitable waste under § 262.21 of this chapter; or

         (B) Meets the definition of reactive waste under § 262.21 of this chapter and may form an ignitable or explosive vapor; and

      (vi) Provided with an exterior moisture barrier or be otherwise designed or operated to prevent migration of moisture into the vault if the vault is subject to hydraulic pressure.

(3) Double-walled tanks must be:
(i) Designed as an integral structure (i.e., an inner tank within an outer shell) so that any release from the inner tank is contained by the outer shell;

(ii) Protected, if constructed of metal, from both corrosion of the primary tank interior and the external surface of the outer shell; and

(iii) Provided with a built-in, continuous leak detection system capable of detecting a release within 24 hours or at the earliest practicable time, if the owner or operator can demonstrate to the Regional Administrator, and the Regional Administrator concurs, that the existing leak detection technology or site conditions will not allow detection of a release within 24 hours.

[Note: The provisions outlined in the Steel Tank Institute's (STI) "Standard for Dual Wall Underground Steel Storage Tanks" may be used as guidelines for aspects of the design of underground steel double-walled tanks.]

(f) Ancillary equipment must be provided with full secondary containment (e.g., trench, jacketing, double-walled piping) that meets the requirements of paragraphs (b) and (c) of this section except for:

(1) Aboveground piping (exclusive of flanges, joints, valves, and connections) that are visually inspected for leaks on a daily basis;

(2) Welded flanges, welded joints, and welded connections that are visually inspected for leaks on a daily basis;

(3) Sealless or magnetic coupling pumps and sealless valves, that are visually inspected for leaks on a daily basis; and

(4) Pressurized aboveground piping systems with automatic shut-off devices (e.g., excess flow check valves, flow metering shutdown devices, loss of pressure actuated shut-off devices) that are visually inspected for leaks on a daily basis.

(g) The owner or operator may obtain a variance from the requirements of this Section if the Regional Administrator finds, as a result of a demonstration by the owner or operator, either: that alternative design and operating practices, together with location characteristics, will prevent the migration of hazardous waste or hazardous constituents into the ground water or surface water at least as effectively as secondary containment during the active life of the tank system or that in the event of a release that does migrate to ground water or surface water, no substantial present or potential hazard will be posed to human health or the environment. New underground tank systems may not, per a demonstration in accordance with paragraph (g)(2) of this section, be exempted from the secondary containment requirements of this section. Application for a variance as allowed in paragraph (g) of this section does not waive compliance with the requirements of this Subpart for new tank systems.

(1) In deciding whether to grant a variance based on a demonstration of equivalent protection of ground water and surface water, the Regional Administrator will consider:

(i) The nature and quantity of the waste;

(ii) The proposed alternate design and operation;

(iii) The hydrogeologic setting of the facility, including the thickness of soils between the tank system and ground water; and

(iv) All other factors that would influence the quality and mobility of the hazardous constituents and the potential for them to migrate to ground water or surface water.

(2) In deciding whether to grant a variance based on a demonstration of no substantial present or potential hazard, the Regional Administrator will consider:

(i) The potential adverse effects on ground water, surface water, and land quality taking into account:

(A) The physical and chemical characteristics of the waste in the tank system, including its potential for migration,

(B) The hydrogeological characteristics of the facility and surrounding land,

(C) The potential for health risks caused by human exposure to waste constituents,

(D) The potential for damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents, and

(E) The persistence and permanence of the potential adverse effects;

(ii) The potential adverse effects of a release on ground-water quality, taking into account:

(A) The quantity and quality of ground water and the direction of ground-water flow,

(B) The proximity and withdrawal rates of water in the area,

(C) The current and future uses of ground water in the area, and
(D) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;

(iii) The potential adverse effects of a release on surface water quality, taking into account:

(A) The quantity and quality of ground water and the direction of ground-water flow,

(B) The patterns of rainfall in the region,

(C) The proximity of the tank system to surface waters,

(D) The current and future uses of surface waters in the area and any water quality standards established for those surface waters, and

(E) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality; and

(iv) The potential adverse effects of a release on the land surrounding the tank system, taking into account:

(A) The patterns of rainfall in the region, and

(B) The current and future uses of the surrounding land.

(3) The owner or operator of a tank system, for which a variance from secondary containment had been granted in accordance with the requirements of paragraph (g)(1) of this section, at which a release of hazardous waste has occurred from the primary tank system but has not migrated beyond the zone of engineering control (as established in the variance), must:

(i) Comply with the requirements of § 265.196, except paragraph (d), and

(ii) Decontaminate or remove contaminated soil to the extent necessary to:

(A) Enable the tank system, for which the variance was granted, to resume operation with the capability for the detection of and response to releases at least equivalent to the capability it had prior to the release, and

(B) Prevent the migration of hazardous waste or hazardous constituents to ground water or surface water; and

(iii) If contaminated soil cannot be removed or decontaminated in accordance with paragraph (g)(3)(ii) of this section, comply with the requirements of § 265.197(b).

(4) The owner or operator of a tank system, for which a variance from secondary containment had been granted in accordance with the requirements of paragraph (g)(1) of this section, at which a release of hazardous waste has occurred from the primary tank system and has migrated beyond the zone of engineering control (as established in the variance), must:

(i) Comply with the requirements of § 265.196(a), (b), (c), and (d); and

(ii) Prevent the migration of hazardous waste or hazardous constituents to ground water or surface water, if possible, and decontaminate or remove contaminated soil. If contaminated soil cannot be decontaminated or removed, or if ground water has been contaminated, the owner or operator must comply with the requirements of § 265.197(b);

(iii) If repairing, replacing, or reinstalling the tank system, provide secondary containment in accordance with the requirements of paragraphs (a) through (f) of this section or reapply for a variance from secondary containment and meet the requirements for new tank systems in § 265.192 if the tank system is replaced. The owner or operator must comply with these requirements even if contaminated soil can be decontaminated or removed, and ground water or surface water has not been contaminated.

(h) The following procedures must be followed in order to request a variance from secondary containment:

(1) The Regional Administrator must be notified in writing by the owner or operator that he intends to conduct and submit a demonstration for a variance from secondary containment as allowed in paragraph (g) of this section according to the following schedule:

(i) For existing tank systems, at least 24 months prior to the date that secondary containment must be provided in accordance with paragraph (a) of this section; and

(ii) For new tank systems, at least 30 days prior to entering into a contract for installation of the tank system.

(2) As part of the notification, the owner or operator must also submit to the Regional Administrator a description of the steps necessary to conduct the demonstration and a timetable for completing each of the steps. The demonstration must address each of the factors listed in paragraph (g)(1) or paragraph (g)(2) of this section.

(3) The demonstration for a variance must be completed and submitted to the Regional Administrator within 180 days after notifying the Regional Administrator of intent to conduct the demonstration.
The Regional Administrator will inform the public, through a newspaper notice, of the availability of the demonstration of a variance. The notice shall be placed in a daily or weekly major local newspaper of general circulation and shall provide at least 30 days from the date of the notice for the public to review and comment on the demonstration for a variance. The Regional Administrator also will hold a public hearing, in response to a request or at his own discretion, whenever such a hearing might clarify one or more issues concerning the demonstration for a variance. Public notice of the hearing will be given at least 30 days prior to the date of the hearing and may be given at the same time as notice of the opportunity for the public to review and comment on the demonstration. These two notices may be combined.

(5) The Regional Administrator will approve or disapprove the request for a variance within 90 days of receipt of the demonstration from the owner or operator and will notify in writing the owner or operator and each person who submitted written comments or requested notice of the variance decision. If the demonstration for a variance is incomplete or does not include sufficient information, the 90-day time period will begin when the Regional Administrator receives a complete demonstration, including all information necessary to make a final determination. If the public comment period in paragraph (h)(4) of this section is extended, the 90-day time period will be similarly extended.

All tank systems, until such time as secondary containment meeting the requirements of this section is provided, must comply with the following:

(1) For non-enterable underground tanks, a leak test that meets the requirements of § 265.191(b)(5) must be conducted at least annually;

(2) For other than non-enterable underground tanks and for all ancillary equipment, an annual leak test, as described in paragraph (i)(1) of this section, or an internal inspection or other tank integrity examination by an independent, qualified, registered professional engineer that addresses cracks, leaks, corrosion, and erosion must be conducted at least annually. The owner or operator must remove the stored waste from the tank, if necessary, to allow the condition of all internal tank surfaces to be assessed.

[Note: The practices described in the American Petroleum Institute (API) Publication Guide for Inspection of Refinery Equipment. Chapter XIII, "Atmospheric and Low-Pressure Storage Tanks," 4th edition, 1981, may be used, where applicable, as guidelines for assessing the overall condition of the tank system.]

The owner or operator must maintain on file at the facility a record of the results of the assessments conducted in accordance with paragraphs (i)(1) through (i)(3) of this section.

If a tank system or component is found to be leaking or unfit-for-use as a result of the leak test or assessment in paragraphs (i)(1) through (i)(3) of this section, the owner or operator must comply with the requirements of § 265.196.

§ 265.194 General operating requirements.

Hazardous wastes or treatment reagents must not be placed in a tank system if they could cause the tank, its ancillary equipment, or the containment system to rupture, leak, corrode, or otherwise fail.

The owner or operator must use appropriate controls and practices to prevent spills and overflows from tank or containment systems. These include at a minimum:

(1) Spill prevention controls (e.g., check valves, dry discount couplings);

(2) Overfill prevention controls (e.g., level sensing devices, high level alarms, automatic feed cutoff, or bypass to a standby tank); and

(3) Maintenance of sufficient freeboard in uncovered tanks to prevent overtopping by wave or wind action or by precipitation.

The owner or operator must comply with the requirements of § 265.196 if a leak or spill occurs in the tank system.

§ 265.195 Inspections.

The owner or operator must inspect, where present, at least once each operating day:

(1) Overfill/spill control equipment (e.g., waste-feed cutoff systems, bypass systems, and drainage systems) to ensure that it is in good working order.
Appendix B

Qualification of Contractors
SUBCONTRACTOR QUALIFICATION STATEMENT

Lockheed Idaho Technologies Company (LITCO) is the Construction Manager under contract with DOE-ID for supporting and overseeing construction activities at the INEL. The construction for the Filter Leach Modifications Project was performed in the Filter Handling Cell of the Decontamination Facility at the New Waste Calcining Facility (NWCF). Work was performed both inside the Filter Handling Cell, in the clean operating corridor, and in adjacent cells. All of the cells are radioactively contaminated. The areas of work requiring access into radiation areas was performed by personnel from both Wheeler and Dynamics.

Dynamics, Incorporated was selected as the Subcontractor, and performed the mechanical installation inside and outside of the cell. Wheeler, Electric, was selected to perform the electrical work. Both Dynamics and Wheeler have previously qualified to perform construction work at the INEL. They have both had many years of successful construction project completion at the INEL.

Dynamics performed the installation of the piping and equipment. Wheeler Electric installed all of the necessary electrical equipment. All of the work was completed as specified, and all inspection requirements were successfully met.

Thornton H. Waite
Filter Leach Modifications Project
March 17, 1995
Appendix C
Certification Records of Welders and Inspectors
# QUALITY ASSURANCE INSPECTION SECTION

## INSPECTOR QUALIFICATIONS

<table>
<thead>
<tr>
<th>July 12, 1994 NAME</th>
<th>GENERAL INSPI.</th>
<th>PIPE CODE</th>
<th>PRESSURE TEST</th>
<th>ELEC CODE</th>
<th>ELEC EQUIP</th>
<th>HI-POT TEST</th>
<th>CIVIL CODE</th>
<th>SLUMP TEST</th>
<th>CYLINDER TEST</th>
<th>AIR TEST</th>
<th>UNIT WEIGHT TEST</th>
<th>SOILS/ ASPHALT DENSITY</th>
<th>SURVEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC Smith</td>
<td>22</td>
<td>9/96</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2/97</td>
<td>2/97</td>
<td>2/97</td>
<td>2/97</td>
<td>2/97</td>
<td>2/97</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The table above represents the inspector qualifications for various individuals with specific dates indicating their certifications or qualifications. The columns indicate different aspects of quality assurance such as general inspection, pipe code, pressure test, electrical code, etc.
# QUALITY ASSURANCE INSPECTION SECTION

## NDE CERTIFICATIONS

<table>
<thead>
<tr>
<th>September 30, 1994 NAME</th>
<th>RADIOGRAPHY RT II</th>
<th>VISUAL EXAM VT II</th>
<th>LIQUID PENETRANT LP II</th>
<th>ULTRASONIC EXAM UT II</th>
<th>ULTRASONIC THICKNESS UTT</th>
<th>LEAK TESTING LT II</th>
<th>MAGNETIC PARTICLE MP II</th>
<th>EDDY CURRENT ETT II</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT Baker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BB Brown</td>
<td>8/95</td>
<td>2/97</td>
<td>5/95</td>
<td></td>
<td></td>
<td>1/97</td>
<td>5/95</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DF Capp</td>
<td>2/97</td>
<td>1/97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9/96</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DP Crossley</td>
<td>8/95</td>
<td>2/97</td>
<td>7/95</td>
<td></td>
<td></td>
<td>2/97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC Dunlap</td>
<td>8/95</td>
<td>1/97</td>
<td>5/95</td>
<td></td>
<td>5/95</td>
<td>1/97</td>
<td>5/95</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LE Gilson</td>
<td>2/97</td>
<td>8/95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1/97</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8C Killian</td>
<td>8/95</td>
<td>2/97</td>
<td>5/95</td>
<td></td>
<td>5/95</td>
<td>1/97</td>
<td>10/95</td>
<td>2/97</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DL Klinger</td>
<td>8/95</td>
<td>2/97</td>
<td>9/95</td>
<td></td>
<td></td>
<td>2/97</td>
<td>2/97</td>
<td>10/95</td>
</tr>
<tr>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AJ Lords</td>
<td>2/97</td>
<td>5/95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2/97</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macfarlane</td>
<td>2/97</td>
<td>5/95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6/97</td>
</tr>
<tr>
<td>43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC Martin</td>
<td>1/97</td>
<td>5/95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6/97</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TL Medran</td>
<td>8/95</td>
<td>2/97</td>
<td>6/95</td>
<td></td>
<td>5/95</td>
<td>5/97</td>
<td>5/95</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR Nate</td>
<td>8/95</td>
<td>6/97</td>
<td>6/95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10/95</td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MJ Osborne</td>
<td>2/97</td>
<td>6/95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA Redden</td>
<td>7/97</td>
<td>5/95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7/97</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EB Robison</td>
<td>8/95</td>
<td>7/97</td>
<td>5/95</td>
<td></td>
<td></td>
<td>5/95</td>
<td>9/96</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8C Smith</td>
<td>8/95</td>
<td>11/94</td>
<td>5/95</td>
<td></td>
<td>5/95</td>
<td>2/97</td>
<td>5/95</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LL Smith</td>
<td>8/95</td>
<td>2/97</td>
<td>5/95</td>
<td></td>
<td>5/95</td>
<td>2/97</td>
<td>5/95</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


# Construction Vendor Data Submission and Disposition Form

**To:**
MDK Engineering of Idaho Company  
P.O. Box 1745  
Idaho Falls, ID 83402-1745  
ATTN: Document Control MS-5300

**Submittal (Project) Number:** 299425-32  
**Rev:** 0  
**Date of Submittal:** 11/16/94

**Project Title:** MODS TO THE HEPA FILTER LEACH SYSTEM  
**Subcontractor:** DYNAMICS INCORPORATED  
**Subcontractor Code:** 9410-34

**Disposition Legend**
- (A) Work may proceed subject to incorporation of any comments noted.
- (B) Revise and resubmit. Work may proceed subject to incorporation of comments noted.
- (C) Revise and resubmit. Work may NOT proceed.
- (D) Information only. Work may proceed.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>15024-3</td>
<td></td>
<td>8</td>
<td></td>
<td>WELDER QUALIFICATIONS (OFF-SITE)</td>
<td></td>
<td>G.D. PARRISH</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

_Signature:_  
11-16-94

**CMR Review / Approval Required:**
- **Yes** □  
- **No** □

**Recommended Disposition:**

_A_

**Date:** 11-16-94

**O/C Review / Approval Required:**
- **Yes** □  
- **No** □

File
TH Waite  
RM Barker

**Other:**

Bayliss  
11-17

**Other:**

_Initials:_

CB

**O/C Reviewing Agency Signature / Date:**

TH Waite 11-17  
RM Barker 11-17

**Additional Comments Attached:**

- □ (22) Additional Comments Attached

**Distributor:**

<table>
<thead>
<tr>
<th>Document Control</th>
<th>Subcontractor</th>
<th>Operating Contractor</th>
<th>Quality Assurance</th>
</tr>
</thead>
</table>

**Acks & Disack:**

- □ (24) Acks & Disack

**Signature:**

_Initials:_

CB
| Name | S No. | WPS Code | Company | ASME Qualification | AWS D1.1 Position | AWS D1.2 Position | AWS D1.3 Position | AWS D1.3 Position | AWS D1.3 Position | AWS D1.3 Position | AWS D1.3 Position | AWS D1.3 Position | AWS D1.3 Position | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qualification | AWS D1.3 Qua
### Construction Vendor Data Transmittal and Disposition Form

**To:**
MK-Ferguson of Idaho Company
P.O. Box 1715
Idaho Falls, ID 83403-1715
ATTN: Document Control MS-5380

**Submittal (Project) Number:** 299425-33

**Project Title:** MODS TO THE HEPA FILTER LEACH SYSTEM

**Subcontractor:** DYNAMICS INCORPORATED

**Date of Submittal:** 11/16/94

**Contractor Number:** 8-299425

**Subcontractor Code:** 9410-33

**Disposition Legend**
- **(A)** Work may proceed subject to incorporation of any comments noted.
- **(B)** Revise and resubmit. Work may proceed subject to incorporation of comments noted.
- **(C)** Revise and resubmit. Work may NOT proceed.
- **(D)** Information only. Work may proceed.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>15024-3</td>
<td></td>
<td>1</td>
<td></td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>WELDER QUALIFICATIONS (ON-SITE)</td>
<td></td>
<td>A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks**

[Signature]

**Subcontractor Signature**

**Date:** 11-16-94

**CM Review / Approval Required**
- **(Y) Yes**
- **(N) No**

**Recommended Disposition**

[Signature]

**Date:** 11-16-94

**O/C Review / Approval Required**
- **(Y) Yes**
- **(N) No**

**File**

[Signature]

**Date:** 11-18-94

**O/C Review / Approval Required**

**Additional Comments Attached**

**Document Control**

**Subcontractor**

**EH&H Department**

**Operating Center**

**Quality Assurance**
<table>
<thead>
<tr>
<th>Name</th>
<th>S.No.</th>
<th>Welder Code</th>
<th>Company</th>
<th>A.S.M.E.</th>
<th>A.W.S.</th>
<th>D.Q.</th>
<th>J.Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilson, R. J.</td>
<td>45313</td>
<td>ALQ Const</td>
<td>C1.5</td>
<td>All G/F</td>
<td>0.750</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td>Nanan, R. P.</td>
<td>45365</td>
<td>ASU Const</td>
<td>C2.10</td>
<td>All G/F</td>
<td>0.500</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.25</td>
<td>All G/F</td>
<td>0.350</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.40</td>
<td>All G/F</td>
<td>0.350</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td>Dalgado, C. F.</td>
<td>45544</td>
<td>ASU Const</td>
<td>C1.15</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.15</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.20</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td>Pasten, G. B.</td>
<td>21611</td>
<td>1EE Const</td>
<td>C3.0</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3.25</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3.40</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td>Quinnan, R. B.</td>
<td>2166</td>
<td>ASU Const</td>
<td>C3.0</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3.25</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3.40</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td>Reed, G. B.</td>
<td>34412</td>
<td>ASU Const</td>
<td>C2.0</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.25</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.40</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td>Rorer, D. J.</td>
<td>45766</td>
<td>EU Const</td>
<td>C2.15</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.30</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.45</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.60</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.75</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2.90</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3.0</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3.25</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3.40</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3.60</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3.75</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3.90</td>
<td>All G/F</td>
<td>0.250</td>
<td>0.125</td>
<td>24.00</td>
</tr>
</tbody>
</table>

**Note:** The table above lists welder certifications with their corresponding qualifications and test results. The certifications are categorized by A.S.M.E. and A.W.S. standards, and include positions such as All G/F, All G/F, and All G/F. The test results include max. thick. and min. thick. values.
Construction Vendor Data Transmittal and Disposition Form

(1) Submittal (Project) Number: 299425
(2) Rev.: 0
(3) Date of Submittal: 10/19/94
(4) Project Title: MODS TO THE HEPA FILTER LEACHING SYSTEM
(5) Subcontract Number: S-299425
(6) Subcontractor: DYNAMICS INCORPORATED
(7) Subcontractor Code: 9410-19

(A) Work may proceed subject to incorporation of any comments noted.
(B) Revise and resubmit. Work may proceed subject to incorporation of comments noted.
(C) Revise and resubmit. Work may NOT proceed.
(D) Information only. Work may proceed.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>18</td>
<td>15024-3</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WELDER QUALIFICATIONS (OFF-SITE)
(D. MUNN)

Remarks:

Subcontractor Signature: 10/19/94

Subcontractor Signature: 10/20/94

-- Additional Comments Attached --

C/M Review / Approval Required: Yes

Additional Comments Attached: Yes

O/C Review / Approval Required: Yes

Additional Comments Attached: Yes

I acknowledge receipt of the data indicated and agree to incorporate any comments.

Contractor Signature: 10/25/94

Date: 10/19/94

DISTRIBUTION:
- Document Control
- Subcontractor
- Operating Contractor
- Quality Assurance
- Construction Supervisor

Distribution: Cvr Sets Distribution: Cvr Sets

Subcontractor

Operating Contractor

Quality Assurance

Construction Supervisor
Positions
1 Flatt
2 Horizontal
3 Vertical
4 Overhead
5 Pipe Horizontal
6 45° Incline
7 Groove(s)
8 Filler(s)
9 DH Down Hill
10 LJ Lap Joint
11 Plug Plug Weld
12 W/W/O FM With/Without Filler Material
13 a Backing Strip

Welding Processes
GTAW Gas Tungsten Arc Welding
SMAW Shielding Metal Arc Welding
GMAW Gas Metal Arc Welding
FCAW Flux Cored Arc Welding
TB Torch Brazing H-101

Examples
Welding-12GF Flat, Horizontal Position with Groove and Filler
Brazing - LJ Lap Joint

This Qualification is valid only for INEL projects until it expires or is revoked

INEL Welding Engineer Signature
CONSTRUCTION SUBMITAL FORM

(1) Submittal (Project) Number: 299425-12
(2) Rev. 0
(3) Date of Submittal: 10/19/94
(4) Project Title: MODS TO THE HEPA FILTER LEACHING SYSTEM
(5) Subcontract Number: S-299425
(6) Subcontractor: DYNAMICS INCORPORATED
(7) Subcontractor Code: 9410-18

Position and
(A) Work may proceed subject to incorporation of any comments noted.
(B) Revise and resubmit. Work may proceed subject to incorporation of comments noted.
(C) Revise and resubmit. Work MAY NOT proceed.
(D) Information only. Work may proceed.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>15024-3</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>WELDER QUALIFICATIONS (ON-SITE)</td>
<td></td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

Remarks

[Signature]

(16) Subcontractor Signature

Date

C/A Review / Approval Required ☑ Yes ☐ No

(18) Recommended Disposition

(19) M/E-FG Reviewing Agency Signature / Date

☑ (20) Additional Comments Attached

O/C Review / Approval Required ☑ Yes ☐ No

File

[Signature]

(19) M/E-FG Reviewing Agency Signature / Date

☑ (20) Additional Comments Attached

O/C Review / Approval Signature / Date

☑ (23) Additional Comments Attached

14. I acknowledge receipt of the data indicated and (agree ☑ disagree ☐) to incorporate any comments.

Subcontractor Signature ______________________ Date ____________

Distribution

- Document Control
- Subcontractor
- ES&A Department
- Operating Contractor
- Quality Assurance
- Construction Supervisor
**Construction Vendor Transmittal and Disposition Form**

To:  
AIK-Ferguson of Idaho Company  
P.O. Box 1745  
Idaho Falls, ID 83403-1745  
ATTN: Document Control MS-5300

(1) Submittal (Project) Number: 299425-14  
(2) Rev. 0  
(3) Date of Submittal 10/03/94

(4) Project Title: MODS TO THE HEPA FILTER LEACHING SYSTEM  
(5) Subcontract Number: S-299425  
(6) Subcontractor: DYNAMICS INCORPORATED  
(7) Subcontractor Code: 9410-11

### Disposition Legend

- (A) Work may proceed subject to incorporation of any comments noted.  
- (B) Review and resubmit. Work may proceed subject to incorporation of comments noted.  
- (C) Review and resubmit. Work may NOT proceed.  
- (D) Information only. Work may proceed.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>16</td>
<td>15024-3</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>WELDER QUALIFICATION (ON-SITE)</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks**

[Signature]

**Subcontractor Signature**

Date: 10-3-94

**CA1 Review / Approval Required** ☑ Yes  ☐ No

**Recommended Disposition** A

(15) Date Received  10/12/94  
(16) Date Forwarded  10/12  
(17) Forwarded To: R. Duke  
(18) Qty 7  
(19) Initial: CB

(20) Additional Comments Attached

**OGC Review / Approval Required** ☑ Yes  ☐ No

File: TH Waite  
RM Barker

Date: 10-24-94  
Initial: LA

**OGC Reviewing Agency Signature / Date**

**Additional Comments Attached**

**Distribution**

- Document Control  
- Subcontractor  
- Operating Contractor

**Quality Assurance**
<table>
<thead>
<tr>
<th>Name</th>
<th>No.</th>
<th>Code</th>
<th>Company</th>
<th>VPS Qual</th>
<th>ASQ Qual</th>
<th>APS1 Qual</th>
<th>APS1 Qual</th>
<th>APS2 Qual</th>
<th>APS2 Qual</th>
<th>APS3 Qual</th>
<th>APS3 Qual</th>
<th>EFT Qual</th>
<th>Thickness</th>
<th>Diameter</th>
<th>General</th>
<th>Cap. State</th>
<th>Orig. Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infl. U. B.</td>
<td>50486</td>
<td>56</td>
<td>CONG1</td>
<td>52.24</td>
<td>All F</td>
<td>5.000</td>
<td>0.125</td>
<td>10.000</td>
<td>0.125</td>
<td>15.750</td>
<td>20.000</td>
<td>01/18/94</td>
<td>08/19/94</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moistland, E. V.</td>
<td>51933</td>
<td>ASH</td>
<td>CONG1</td>
<td>C3.0</td>
<td>12 G/F</td>
<td>0.476</td>
<td>0.063</td>
<td>3.250</td>
<td>02/18/94</td>
<td>08/19/94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trevor, R E.</td>
<td>30590</td>
<td>UK</td>
<td>CONG1</td>
<td>C2.0</td>
<td>All G/F</td>
<td>0.436</td>
<td>0.063</td>
<td>1.000</td>
<td>02/18/94</td>
<td>08/19/94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tollell, D C.</td>
<td>10716</td>
<td>ON</td>
<td>CONG1</td>
<td>C2.0</td>
<td>All G/F</td>
<td>0.436</td>
<td>0.063</td>
<td>1.000</td>
<td>08/19/94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tollell, J L.</td>
<td>41625</td>
<td>CV</td>
<td>CONG1</td>
<td>A2.0</td>
<td>All F</td>
<td>0.250</td>
<td>0.063</td>
<td>20.000</td>
<td>12/18/93</td>
<td>07/02/93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>James, R M.</td>
<td>40149</td>
<td>ACS2</td>
<td>CONG1</td>
<td>C3.0</td>
<td>All G/F</td>
<td>0.436</td>
<td>0.063</td>
<td>1.000</td>
<td>02/18/94</td>
<td>08/19/94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jones, R S.</td>
<td>41999</td>
<td>ADJ</td>
<td>CONG1</td>
<td>C2.24</td>
<td>All F</td>
<td>0.150</td>
<td>0.125</td>
<td>20.000</td>
<td>02/18/94</td>
<td>08/19/94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jones, T L.</td>
<td>47766</td>
<td>BS</td>
<td>CONG1</td>
<td>C1.0</td>
<td>All G/F</td>
<td>0.436</td>
<td>0.063</td>
<td>1.000</td>
<td>02/18/94</td>
<td>08/19/94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>-----------</td>
<td>----------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>----------</td>
<td>-------------</td>
<td>--------------</td>
<td>-----</td>
<td>------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>18</td>
<td>15024-3</td>
<td>8</td>
<td>1</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>WELDER QUALIFICATIONS (OFF-SITE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks

J. A. Baker

10-3-94

C/M Review / Approval Required: Yes

R. Duke

10/12/94

O/C Review / Approval Required: Yes

L. May

10-12

R. Barker

10/13

<table>
<thead>
<tr>
<th>(19) Date Received</th>
<th>Date Forwarded</th>
<th>Forwarded To</th>
<th>Qty Req</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-12</td>
<td>10-12</td>
<td>K. Orr</td>
<td>7</td>
<td>C9</td>
</tr>
<tr>
<td>10-12</td>
<td>10-12</td>
<td>L. May</td>
<td>7</td>
<td>C73</td>
</tr>
</tbody>
</table>

Distribution

- Document Control: Subcontractor
- ES&A Department: Operating Contractor
- Quality Assurance: 
- Construction Supervisor: 

Subcontractor Signature

Date

10-20-94

1. Acknowledge receipt of the data indicated and agree to incorporate any comments.
<table>
<thead>
<tr>
<th>Name</th>
<th>No.</th>
<th>Code</th>
<th>Company Code</th>
<th>Unit</th>
<th>ASG Positions</th>
<th>ASG Thickness</th>
<th>ASG Diameter</th>
<th>ASG Diameter</th>
<th>ASG Diameter</th>
<th>ASG Diameter</th>
<th>ASG Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puhl, W. E.</td>
<td>40433</td>
<td>SQ</td>
<td>CPRS1</td>
<td>31.74</td>
<td>All F</td>
<td>0.000</td>
<td>0.125</td>
<td>24.000</td>
<td>04/19/94</td>
<td>07/19/95</td>
<td>09/27/94</td>
</tr>
<tr>
<td>Warnand, D. V.</td>
<td>34933</td>
<td>ADJ</td>
<td>CPRS1</td>
<td>1.90</td>
<td>All GY</td>
<td>0.014</td>
<td>0.063</td>
<td>1.000</td>
<td>01/27/94</td>
<td>03/26/94</td>
<td>05/27/94</td>
</tr>
<tr>
<td>Trower, W. E.</td>
<td>30900</td>
<td>TR</td>
<td>CPRS1</td>
<td>1.90</td>
<td>All GY</td>
<td>0.016</td>
<td>0.062</td>
<td>1.000</td>
<td>02/27/94</td>
<td>04/27/94</td>
<td>06/27/94</td>
</tr>
<tr>
<td>Hassell, D. C.</td>
<td>82114</td>
<td>08</td>
<td>CPRS1</td>
<td>1.90</td>
<td>All GY</td>
<td>0.026</td>
<td>0.062</td>
<td>1.000</td>
<td>03/27/94</td>
<td>05/27/94</td>
<td>07/27/94</td>
</tr>
<tr>
<td>Hassell, J. L.</td>
<td>50005</td>
<td>CV</td>
<td>CPRS1</td>
<td>1.90</td>
<td>All GY</td>
<td>0.026</td>
<td>0.063</td>
<td>1.000</td>
<td>04/27/94</td>
<td>06/27/94</td>
<td>08/27/94</td>
</tr>
<tr>
<td>Jones, O. H.</td>
<td>04445</td>
<td>ACS</td>
<td>CPRS1</td>
<td>1.90</td>
<td>All GY</td>
<td>0.000</td>
<td>0.125</td>
<td>24.000</td>
<td>06/18/94</td>
<td>08/18/94</td>
<td>10/18/94</td>
</tr>
<tr>
<td>Jones, R. S.</td>
<td>27007</td>
<td>69</td>
<td>CPRS1</td>
<td>1.90</td>
<td>All GY</td>
<td>0.013</td>
<td>0.062</td>
<td>1.000</td>
<td>04/18/94</td>
<td>06/18/94</td>
<td>08/18/94</td>
</tr>
<tr>
<td>Jones, R. L.</td>
<td>27906</td>
<td>69</td>
<td>CPRS1</td>
<td>1.90</td>
<td>All GY</td>
<td>0.013</td>
<td>0.062</td>
<td>1.000</td>
<td>05/18/94</td>
<td>07/18/94</td>
<td>09/18/94</td>
</tr>
</tbody>
</table>
HWMA/RCRA PART B PERMIT
FOR THE IDAHO NATIONAL LABORATORY

Volume 18 – Idaho Nuclear Technology and Engineering Center

APPENDIX 9

Debris Treatment Processes
Holdup and Collection Tanks
CPP-659/-1659 Storage
CPP-666 FDP Cell Container Storage and Slab Tank Storage
Other Miscellaneous Treatment Processes
RMWSF (CPP-1617) Container Storage Area

FDP CELL SLAB TANK CERTIFICATIONS

Effective Date: April 27, 2009
PROCUREMENT ACTIVITIES REPORT

2. Report Period
From 2/7 Thru 2/24/86

3. P.O./Subcontract No.
207254

4. Supplier:
Silver Engineering Works

5. Address
Aurora, Colorado

6. Item Description
Slab Tank, VES-FC-184

8. Specification
20000-M1, 30000-W3

9. Drawing
S.E.W. DB20204 Sh. 1 and DB20205 Sh. 1 of 1

10. Supplier Personnel Contacted
Mr. Tom Theil

11. Quality Engineer/QFR
J. M. Adam

12. Problem Areas, Tentative or Accomplished Solutions, Results — Surveillance/Inspection/Evaluation Activities:
A visit was made to Silver Engineering Works of Aurora, Colorado, to perform in-process and final inspections of one slab tank, VES-FC-184, per the specifications listed above and quality assurance planning 51299, and the quality assurance marked drawings. My contact at Silver Engineering Works (S.E.W.) was Mr. Tom Theil, Quality Manager.

1. A dimensional inspection was performed per "Q.A." marked drawings; all dimensions are acceptable except through hole for nozzle N-L, see SDR #4.

2. A visual inspection was performed on all accessible welds. They are acceptable.

3.a Ultrasonic examination of nozzle welds was not performed by virtue of SDR #3 eliminating ultrasonic examination of the nozzle welds.

3.b A review of S.E.W. test reports was made to verify that the root and final weld passes were liquid penetrant examined. This review disclosed that the root weld pass of shell plate 2R had not been liquid penetrant examined. S.E.W. issued a Suppliers Disposition Request (SDR) #002, recommending liquid penetrant examination of the 2nd pass and cover pass on the other side of the shell plate. Joe Pruitt, Project Engineer and Dan Schell, Quality Engineer were contacted per telephone and concurred with S.E.W.'s recommendation and directed this QFR to sign the SDR indicating approval. This was adhered to by this QFR. All liquid penetrant examinations are acceptable.

13. Distribution:
J. Pruitt
E. Trenchak
J. Boyington
J. M. Adam

File

14. QE/QFR Signature:
Date: 3/11/86

QP Supervisor Signature:
Date: 3/11/86

Extension:
6:35PM
3. c Radiographic film of pressure boundary welds was interpreted and the welds and radiographs are acceptable.

4. Critically Prevention Limit (C.P.L.) was measured prior to and after the stiffner plates were installed to verify C.P.L. This was accomplished by the ultrasonic method. All readings, before and after the stiffeners were installed, are within drawing tolerances and are acceptable.

5. A hydrostatic pressure test, with the slab tank in a vertical position, was performed by S.E.W. per the specifications and the drawing. No leaks or deformation were detected. The hydrostatic pressure test is acceptable.

6. Prior to final closure of the slab tank, a free iron test was performed per ASTM A380, Section 7.2.5.1, "Water-Wetting and Drying" on the internals of the tank. The test is acceptable.

7. Final cleaning was performed by S.E.W. per the requirements of Specification 30000-M1 3.06; final cleaning is acceptable.

8. A visual inspection was performed on the name plate to verify compliance with Specification 30000-M1 2.03; the name plate is acceptable.

9. Preparation for shipment was witnessed by this QFR and is acceptable.

10. A Suppliers Quality Assurance Release, Form WINCO 7022, was issued with the following conditions: pending formal approval of SDR's 3 and 4.
SUPPLIER DATA TRANSMITTAL AND DISPOSITION

Contract No. 207254

To: WESTINGHOUSE IDAHO NUCLEAR CO., INC.
   1953 FREMONT AVE.
   Box 4000
   Idaho Falls, Idaho 83403

From: SILVER ENGINEERING WORKS
   14800 E. MONROE PIKE
   AURORA, CO. 80011

Document No.
VES-FC-184

Contract Reference:

Suppliers Signature
[Signature]

Date 1/1/86

Title MANUFACTURER QUALITY ASSURANCE

Received at WINCO 1/1 by

Disposition:
Approved

Comments: Attached Sheet(s) No Comment

Additional note: Any increase does not relieve Seller of his responsibility to meet contractual requirements, nor does it authorize any increase in price or delay in delivery.

WINCO Procurement Signature

WINCO Requester Signature

WINCO Reviewers

Rec'd. 1/8/86 Ret'd. 1/8/86
Rec'd. 1/8/86 Ret'd. 1/8/86
Rec'd. 1/8/86 Ret'd. 1/8/86
Rec'd. 1/1 Ret'd. 1/1
Rec'd. 1/1 Ret'd. 1/1

If Seller considers that disposition herein constitutes a price increase or delivery delay, no compliance with the disposition shall be initiated.
HYDROSTATIC TEST PROCEDURE

1. Hydro Static Testing will be accomplished in accordance with ASME Boiler and Pressure Vessel Code Section VIII Division 1, UG99.

2. Test media shall be water having a chloride content of not more than 35 PPM.

3. Nozzles are to be restored to drawing condition at the completion of the test.

4. Vessel to be pumped up to 150 psig (new condition) for a minimum of 1 hour with no detectable loss. Calibrated and certified gauges will be used to monitor any pressure drop.

5. Any detectable leaks shall be repaired, the areas cleaned and the hydrotest reperformed.

Contract No. 207254-5
By [Signature] Date 1-10-86
SILVER ENGINEERING WORKS, INC.

Certification of Hydro-Static Test

Name of Part: SHAB TANK
S/N of Vessel: 6-10-001
Date of Test: 2/22/86
Test Pressure: 150 PSIG
Test Held For: 1 Hour
Temperature of Water: AMBIENT °F.
S/N of Test Gauge: SG101

Witness: [Signature]
S.E.W. Inspector: [Signature]
Authorized Inspector: [Signature]

[Stamp]
CERTIFIED BY
SILVER ENGINEERING WORKS INC.
AURORA, COLORADO

MAX. ALLOW. WORKING PRESSURE 100 PSIG
AT TEMPERATURE 104°F

SERIAL NO. 86-10-001 YEAR BUILT 1986

SLAB TANK EQUIPMENT NO. VES-FC-184

SHELL MATERIAL SA 240 GR. 304L

DESIGN PRESSURE 100 PSIG AT 104°F

TEST PRESSURE 150 PSIG

WEIGHT 6700 LB

PURCHASE ORDER NO. 207254

R 3/16 x 5 3/4 x 12; SA 240 GR. 304L

LETTER SIZE 5/32"
FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS
(Alternative Form for Single Chamber, Completely Shop-Fabricated Vessels Only)
As Required by the Provisions of the ASME Code Rules, Section VIII, Division I

1. Manufactured and certified by SILVER ENGINEERING WORKS INC. 16800 E. MONCREIFF PL., AURORA, CO 80011

2. Manufactured for WESTINGHOUSE IDAHO NUCLEAR CO. INC., BOX 4000, IDAHO FALLS, IDAHO 83403

3. Location of installation SAME

4. Type HORIZ RECT TANK 86-10-001 - DB 20204 - 1986

5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Rules, Section VIII, Division 1.

June 30, 1985

6. Shell: SA 240-304L 0.75 0.125 2\"x60\" 96\" Special Service per UG-1206

7. Seams: SG NL BUTT WELD SPOT - - - SG NL BUTT WELD SPOT 1

8. Heads: (a) Mat. SA 240-304L (b) Mat. SA 240-304L

9. MAWP 100 psi at max. temp. °F. Hydro, pneu., or comb. test pressure (VERT) 150 psi

10. Nozzles, inspection and safety valve openings:

11. Supports: Skirt - Lugs 4 Legs 1 - Attached WELDED BOTT. & TOP

12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report:

CERTIFICATE OF SHOP COMPLIANCE

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Pressure Vessels, Section VIII, Division 1. "U" Certificate of Authorization No. 5767 expires June 4, 1988.

Date: 2-22-86 Co. name: SILVER ENGINEERING WORKS, INC. Signed: "Lumbermens Mutual Casualty Co.

Vessel constructed by SILVER ENGINEERING WORKS, INC. at AURORA, COLORADO

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of COLORADO and employed by LUMBERMENS MUTUAL CASUALTY CO. have inspected the component described in this Manufacturer's Data Report on 2-22-86 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME Code, Section VIII, Division 1. By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date: 2-22-86 Signed:

This form (EO0117) may be obtained from the Order Dept., ASME, 345 E. 47th St., New York, N.Y. 10017
<table>
<thead>
<tr>
<th>Date Report Item Number</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>PROCESS 2 ea. 1&quot; BUTT. WELD SA 479-304L 0.218 NONE WELDED BOTTOM</td>
</tr>
<tr>
<td>Nozzles</td>
<td>PROCESS 4 ea. 4&quot; BUTT. WELD SB 622-C22 0.187 NONE WELDED TOP</td>
</tr>
<tr>
<td>Cont.</td>
<td>PROCESS 1 ea. 3/4&quot; BUTT. WELDED SB 622-C22 0.218 NONE WELDED TOP</td>
</tr>
<tr>
<td></td>
<td>PROCESS 3 ea. 1&quot; BUTT. WELDED SB 622-C22 0.250 NONE WELDED TOP</td>
</tr>
</tbody>
</table>

We may use Idaho Nuclear Co., Inc.

PERMIT TO PROCEED. Project Personnel are acting in accordance with instructions given in latest revision of drawings, specifications, and material data sheets. We have verified and do not release supplier from full compliance with code.

- Work may proceed.
- Review and Resubmit. Work may proceed subject to incorporation of changes noted.
- Review not required. Work may proceed.

Contract No. 207254

I.D. Pruitt, V.C.S. Date 3/7/86

This form (E00118) is available from the Order Dept., ASME, 346 E. 47 St., New York, N.Y. 10017.
<table>
<thead>
<tr>
<th>Char. No.</th>
<th>Inspection Characteristic</th>
<th>Inspection Status</th>
<th>General Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Perform a dimensional inspection. Per OA, marked dwg. Tolerances per dwg. and Spec 30000-M1 Sub 2. Note: Nozzles shall not be located in any seam without prior written approval.</td>
<td>WO2</td>
<td>See report P027 by Adam.</td>
</tr>
<tr>
<td>2</td>
<td>Perform a visual inspection of all accessible welds. Reject welds that have not been properly contoured/finished for the acceptable inspection method. Reject excessive undercut and excessive reinforcement. Reject fillet welds that are undersize or overrun.</td>
<td>WO2</td>
<td>See report P027 by Adam.</td>
</tr>
</tbody>
</table>
| 3         | Witness U.T. of nozzles.
<table>
<thead>
<tr>
<th>Char. No.</th>
<th>Inspection Characteristic</th>
<th>Inspection Status</th>
<th>General Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Non-Destructive Examination</td>
<td></td>
<td>See report P-027 by J. Adam</td>
</tr>
<tr>
<td>3</td>
<td>L. P.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Verify by review of test reports that the root and final passes of all pressure retaining welds have been inspected and accepted by the L.P. Method.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R. T.</td>
<td></td>
<td>See report P-027 by J. Adam</td>
</tr>
<tr>
<td>3</td>
<td>Interlaced radiographic film per ASME Sec VIII Div 1 for LW-51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Punch film to indicate accept-reject of film and welds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>INSPECTION HOLD POINT WITNESS: CPL - dimension inspection</td>
<td></td>
<td>See report P-027 by J. Adam</td>
</tr>
<tr>
<td>5</td>
<td>INSPECTION HOLD POINT WITNESS: FIT-UP AND WELDING FINAL CLOSURE</td>
<td></td>
<td>See report P-027 by J. Adam</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>6</td>
<td><strong>INSPECT NOZZLES FOR CORRECT LENGTH, SIZE, SCHEDULE AND ORIENTATION</strong> VERIFY I.D. OF NOZZLE IS ALIGNED WITH THROUGH HOLE</td>
<td>[Signature]</td>
<td>[Signature]</td>
</tr>
<tr>
<td>7</td>
<td><strong>WITNESS HYDROSTATIC TEST FOR THE VENDOR'S PROJECT APPROVED PROCEDURE</strong> SPEC 30000 MI 3.05</td>
<td>[Signature]</td>
<td>[Signature]</td>
</tr>
<tr>
<td>8</td>
<td><strong>WITNESS FREE IRON TEST</strong> SPEC 30000 MI 3.05 E</td>
<td>[Signature]</td>
<td>[Signature]</td>
</tr>
<tr>
<td>9</td>
<td><strong>WITNESS FINAL CLEANING</strong> SPEC 30000 MI 3.05</td>
<td>[Signature]</td>
<td>[Signature]</td>
</tr>
<tr>
<td>10</td>
<td><strong>INSPECT NAME PLATE</strong> SPEC 30000 MI 2-03 VENDOR'S PROJECT APPROVED TAGS</td>
<td>[Signature]</td>
<td>[Signature]</td>
</tr>
<tr>
<td>11</td>
<td><strong>WITNESS PREPARATION FOR SHIPMENT OR REVIEW REQUIREMENTS WITH SUPPLIER REP.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td><strong>ISSUE FORM WINCO 7022 SUPPLIER QA RELEASE</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
From: C. L. Porter  
Phone: 6-3101/MS 5119  
Date: April 20, 1993  
Subject: FAST Integrity Assessment

To: S. A. Birrer  
J. E. Hevlow  

cc: S. A. Drewes*  
J. E. Kaylor*  
S. A. Heath - ETAS Corporation*  
J. S. Kilburn - ETAS Corporation*  

* - w/o Attachments

This letter transmits your copy of the completed documents associated with the certification of the integrity of the FAST Facility. This satisfies the requirement of 40 CFR 265.193 and 265.191 for an annual integrity assessment.

C. L. Porter, Project Manager  
Environmental Compliance Projects  

/mh  
Attachments
SECONDARY CONTAINMENT ASSESSMENT
FOR THE
FLUORINEL AND FUEL STORAGE FACILITY (FAST)

APRIL 1993

PREPARED BY: C. L. PORTER, SENIOR ENGINEER
ENVIRONMENTAL COMPLIANCE PROJECTS

WESTINGHOUSE IDAHO NUCLEAR CORPORATION
CO-OPERATOR OF THE IDAHO CHEMICAL PROCESSING PLANT
FOR THE
U. S. DEPARTMENT OF ENERGY
IDAHO FALLS, IDAHO
INDEPENDENT, QUALIFIED, REGISTERED PROFESSIONAL ENGINEER ENDORSEMENT OF THE SECONDARY CONTAINMENT ASSESSMENT FOR THE FLUORINEL AND FUEL STORAGE FACILITY (FAST)

IDAHO CHEMICAL PROCESSING PLANT
IDAHO NATIONAL ENGINEERING LABORATORY
IDAHO FALLS, IDAHO

Based on review of this document, entitled "Secondary Containment Assessment for the Fluorinel and Fuel Storage Facility (FAST)", April 1993, prepared by C.L. Porter of WINCO, ETAS Corporation concurs with WINCO's conclusion that secondary containment, where present, is adequate.

Stanley A. Heath, ETAS Corporation
Project Manager

James S. Kilburn, ETAS Corporation
Idaho P. E. Registration #4504
SECONDARY CONTAINMENT ASSESSMENT
FOR THE
FLUORINEL AND FUEL STORAGE FACILITY (FAST)

INTRODUCTION

The Resource Conservation and Recovery Act (RCRA) per 40 CFR 265.191, requires an integrity assessment for existing hazardous waste tank systems that do not have secondary containment that meet the requirements of 40 CFR 265.193. The integrity assessment is limited to those facilities which are less than 15 years old and do not have secondary containment. The purpose of this secondary containment assessment is to define the boundaries of the hazardous waste system associated with FAST and determine which portions have secondary containment meeting the regulatory standards. This will establish the scope for the subsequent integrity assessment.

FACILITY DESCRIPTION

The Fluorinel and Fuel Storage Facility (FAST) is located in building CPP-666 at the Idaho Chemical Processing Plant (ICPP) is comprised of two separate operating areas: the Fuel Storage Area (FSA) and the Fluorinel Dissolution Process (FDP) area (see Figure 1).

The FDP area of FAST consists of facilities for converting a variety of spent nuclear reactor fuel elements into a liquid-feed solution for subsequent uranium recovery at other ICPP facilities. However, due to the 1992 mission change, spent nuclear fuel is no longer dissolved for uranium recovery at the ICPP.

The FSA of FAST provides facilities for receiving, preparing for storage, storing, transferring, and preparing for processing various fuels received at the ICPP.

FAST, along with its associated tankage and container storage has interim RCRA status. However, the tank systems associated with FDP are being closed under interim status and will be operated as <90 day generator storage units (40 CFR 262.34). The operation of such units requires compliance with the substantive portions of subpart J of 40 CFR part 265. To allow the greatest flexibility for future use of the facility those non-permitted tank systems will be included in this secondary containment assessment. As reflected by the current draft of the RCRA Part B Application for FAST, the only permitted unit within FAST is container storage in the FDP Cell. Since container storage is not subject to the subpart J requirements it will not be included in the scope of this assessment.

WASTE SYSTEM DESCRIPTIONS

FSA Waste Systems-The waste systems associated with FSA are the result of water treatment for the basin water. Two vessels (VES-FT-134 and VES-FT-135) and two sumps (chemical and service waste sumps) are used to collect waste
FLUORINEL DISSOLUTION PROCESS AND FUEL STORAGE FACILITY (cutaway view)

Figure 1
solutions from the treatment activities. Elementary neutralization is performed in the vessels and the sumps to render the acid and caustic nonhazardous. EPA has indicated that all storage and conveyance systems that are elementary neutralization units or are ancillary equipment to an elementary neutralization unit are exempted from RCRA subtitle C regulation. Therefore further consideration of FSA waste systems from a secondary containment standpoint is not required.

FDP Waste Systems—Liquid waste can either be generated in-cell or out-of-cell. In-cell process and decontamination liquid waste is collected in the process vessels or the FDP cell sump collection tank (VES-FC-184, Slab Tank). Liquid waste from FDP operating floor drains, chemical receiving, storage, and makeup area drains, and utility sinks is collected in two waste collection tanks (VES-FA-141, -142) located outside the FDP cell in the corridor at the -31 foot elevation.

Occasionally, waste solutions are generated in the FDP cell, primarily from decontamination activities. Equipment rinse solution is collected on the stainless steel lined cell floor. The floor is sloped to a small diameter, stainless steel sump which is equipped with a liquid level detection instrument. The contents of the sump are transferred to either the slab tank or the product transfer vessel (PTV), which are both located within the stainless steel lined cell. From the in-cell vessels the waste solutions are transferred to the appropriate waste disposal facility: the process equipment waste evaporator or directly to the waste tank farm.

Each chemical makeup tank is provided with an overflow line to direct the flow of any excess solution added to the tank. The overflow lines of the tanks and the drain lines from the containment areas beneath the tanks are routed to either the fluoride collection tank (VES-FA-141) or the non-fluoride collection tank (VES-FA-142). Each of these tanks is located in a stainless steel lined containment area which is equipped with a liquid level detector. Solutions from the tanks can either be transferred to the process equipment waste evaporator, the tank farm, or drummed out for off-site disposal.

SECONDARY CONTAINMENT STANDARDS

Secondary containment systems must meet all the requirements of 40 CFR 265.193. These include:

1) General Design - The secondary containment must be designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater, or surface water [40 CFR 265.193 (b)(1)]. Any accumulated liquid wastes resulting from leaks, spills, or precipitation must be drained and removed within 24 hours [40 CFR 265.193 (c)(4)].

2) Type of Secondary Containment - Secondary containment for tanks must include, at a minimum, a liner external to the tank, a vault, a double-walled tank, or an approved equivalent device [40 CFR 265.193 (d)]. Examples of full secondary containment for ancillary equipment are a trench, jacketing, or double-walled piping [40 CFR 265.193 (f)].
3) **Design Capacity** - Secondary containment for tanks must be designed with the capacity to contain all of the potentially released liquid should a tank (or pipe) fail [40 CFR 265.193 (e)(1)(i), (e)(2)(i), and (e)(3)(i)].

4) **Runoff Diversion/Moisture Barrier** - The secondary containment must be designed to prevent runoff or infiltration of precipitation into the secondary containment and must be provided with an exterior moisture barrier to prevent moisture migration into the secondary containment [40 CFR 265.193 (e)(1)(ii), (e)(2)(ii), and (e)(2)(vi)].

5) **Foundation** - The secondary containment must be supported by an adequate foundation [40 CFR 265.193 (c)(2)].

6) **Liner** - The secondary containment must be constructed of or lined with materials that are compatible with the waste(s) [40 CFR 265.193 (c)(1)]. The liner must be free of cracks or gaps [40 CFR 265.193 (e)(1)(iii)] and prevent migration of waste into the concrete [40 CFR 265.193 (e)(2)(iv)].

7) **Leak Detection** - Leak detection systems must be able to detect the failure of either the primary or the secondary containment structure or any release of hazardous waste or accumulated liquid in the secondary containment system within 24 hours [40 CFR 265.193 (b)(2) and (c)(3)].

8) **Spill Removal** - Secondary containment systems must be designed or operated to remove accumulated liquids from the system within 24 hours [40 CFR 265.193(c)(4)].

**SECONDARY CONTAINMENT ASSESSMENT**

In 1989 the ICPP conducted an assessment of the FDP facility to determine compliance status with RCRA requirements. Among other requirements the assessment addressed the secondary containment requirements of 40 CFR 265.193. The assessment concluded that the requirements for secondary containment were met for all areas except the chemical receiving, storage, and makeup area drains which pass through the soil before they enter the -31 level. A discussion of the salient aspects of the secondary containment requirements follows:

**Types of secondary containment** - The process cell at FDP is equipped with leaktight 304L stainless steel liner systems which slope to the cell sump and which serve as secondary containment to the tanks within. The stainless steel plates conform to ASTM A240. Stainless steel angles, bars and shapes conform to ASTM A276. All liner welds were examined for leak tightness by the vacuum box method in accordance with Article I of Section V of the ASME Code. As described previously the sump receives some wastes directly and hence also functions as primary containment. Since the sump itself does not have secondary containment it will need to be included in the integrity assessment.

The fluoride and non-fluoride waste tanks are located inside a curbed, 304L
stainless steel lined drip pan with a capacity greater than the capacity of the largest tank.

Most of the ancillary equipment and piping for the tank systems at FAST are contained in the same cells or rooms as the waste tanks. Waste lines outside the cells are generally doubly encased in stainless steel pipe. Those piping systems that are not located within secondary containment or double encasement systems are visually inspected daily. One exception to the above are the waste drainlines from the chemical receiving, storage and preparation rooms. Some of these lines pass singly contained through the soil between where they exit the floor of the area and penetrate the wall of the main building in the -31 ft. level. Another exception is a short section of two waste transfer lines within the Product/Transfer Vault, an unlined concrete vault where the lines tie into stainless steel encased transfer lines.

**Design Capacity** - The secondary containment systems at FAST are designed to contain the released liquid should the tank or piping system fail. The Slab Tank, the PTV, and the ancillary piping located within the FDP cell are but a fraction of the volume of the cell. The capacity of the lined drippan for the fluoride and non-fluoride tanks is greater than the capacity of the largest tank.

**Runoff diversion/moisture barrier** - Exterior concrete surfaces below grade were coated with a hot-applied bituminous damproofing. A 6-mil polyethylene vapor barrier was installed beneath concrete slabs on grade. All construction joints in external walls and in floor slabs have waterstops. Flood protection for all the FAST equipment located below grade is provided by the natural arid features of the INEL, a flood diversion system for the Big Lost River, and the facility being designed to withstand the 4916.6 ft standard datum flood (10,000 year flood) without allowing water to enter the facility.

**Foundation** - Support for the liner systems is provided by concrete floor slabs and foundations. The facility was designed to meet the requirements of the 1976 edition of the Uniform Building Code. In addition, the building was designed to withstand the effects of the design basis natural phenomena specified in the project design criteria. The Design Basis Earthquake (DBE) was defined to have a resultant vertical bedrock acceleration of 0.16g and horizontal acceleration of 0.24g.

**Liner compatibility** - Materials of construction were selected following a comprehensive materials testing program that included experimentally determining corrosion rates of the various materials using simulated process solutions. Use of hydrofluoric acid (HF) in the process resulted in extensive use of Hastelloy materials. Although the liners are 304L stainless steel, which is not as resistant to HF as Hastelloy materials, the corrosion rate is such that there is sufficient time to respond to any breach of the primary before the secondary containment is breached. The secondary containment for piping passing through occupied areas is provided by the respective building rooms. The floors and walls of the rooms are coated with polyamide-cured catalyzed epoxy (such as Amercoat 66). The same principle
applies in those areas; the containment material is sufficiently resistent to any possible waste solution leakage that actions can be taken before breach of the secondary containment occurs.

**Leak detection and spill removal** - Leak detection is accomplished in one of two ways; 1) by visual inspection in normally occupied areas and 2) by collection in instrumented sumps for non-accessible areas. The instrumentation is a bubbler probe leak detection system with a high level alarm. Spill removal is accomplished by jetting accumulated liquids from collection sumps/vessels.

**CONCLUSION**

Based on the above information, the only portions of FAST that do not have secondary containment meeting the requirements of 40 CFR 265.193 are 1) the underground sections of the drainlines originating in the chemical receiving, storage, and preparation areas, 2) the sections of the waste transfer lines within the Product/Transfer Vault that are not doubly contained, and 3) the sump of the FDP Cell. Therefore, the scope of the integrity assessment for FAST will be limited to those areas.

**REFERENCES**


5. Technical Specification S1.3 "Cast-in-place Concrete", Ralph M. Parsons Company, Rev. 2, 10/31/81.


7. R.E. Mizia, letter to J.D. Christian, "Results of Fluorinel Cyclic Corrosion Test", dated December 9, 1983.


INTEGRITY ASSESSMENT PLAN
FOR THE
FLUORINEL AND FUEL STORAGE FACILITY (FAST)

APRIL 1993

PREPARED BY:  C. L. PORTER, SENIOR ENGINEER
                ENVIRONMENTAL COMPLIANCE PROJECTS

WESTINGHOUSE IDAHO NUCLEAR CORPORATION
CO-OPERATOR OF THE IDAHO CHEMICAL PROCESSING PLANT
FOR THE
U. S. DEPARTMENT OF ENERGY
IDAHO FALLS, IDAHO
INDEPENDENT, QUALIFIED,
REGISTERED PROFESSIONAL ENGINEER
APPROVAL OF THE
INTEGRITY ASSESSMENT PLAN
FOR THE
FLUORINEL AND FUEL STORAGE FACILITY (FAST)
IDAHO CHEMICAL PROCESSING PLANT
IDAHO NATIONAL ENGINEERING LABORATORY
IDAHO FALLS, IDAHO

I have reviewed this document and believe the proposed inspections, tests and analyses described herein to be sufficient for assessment of the integrity of the Fluorinel and Fuel Storage Facility (Fast). I understand the integrity assessment will be performed in accordance with this Integrity Assessment Plan, and that as the Independent, Qualified, Registered Professional Engineer (IQRPE), I will be asked to certify the report generated by this assessment. I also understand that the inspections, tests, and analyses described herein are based on currently available information and are subject to change during the performance of this assessment. As the IQRPE, I will exercise sound engineering principles in authorizing required changes to these inspections, tests, and analyses.

Stanley A. Heath, ETAS Corporation
Project Manager

James S. Kilburn, ETAS Corporation
Idaho P. E. Registration #4504

4/20/93
Date

4/20/93
Date
INTEGRITY ASSESSMENT PLAN FOR THE FLUORINEL AND FUEL STORAGE FACILITY (FAST)

INTRODUCTION

The Westinghouse Idaho Nuclear Corporation (WINCO) operates the Idaho Chemical Processing Plant (ICPP) for the United States Department of Energy (DOE). Various facilities at the ICPP handle hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). RCRA requires an integrity assessment per 40 CFR 265.191 for existing facilities which are less than 15 years old and do not have secondary containment that meets the requirements of 40 CFR 265.193. One such facility is the Fluorinel and Fuel Storage Facility (FAST).

SCOPE

The scope of this Integrity Assessment Plan (IAP) is to identify the strategy used to evaluate the integrity of the hazardous ancillary piping and equipment associated with FAST. Only those portions of the system which do not have secondary containment, as documented in the Secondary Containment Assessment for the Fluorinel and Fuel Storage Facility, will be included in the integrity assessment. This IAP describes the inspections, tests, rationale, and criteria for the integrity evaluation of the subject ancillary equipment.

SYSTEM DESCRIPTION

As originally designed the Fluorinel and Fuel Storage Facility (FAST) served two distinct functions at the ICPP. The Fuel Storage Area (FSA) provides facilities for receiving, preparing for storage, storing, transferring, and preparing for processing spent nuclear fuels from a variety of sources. This area is currently operating. The second function provided by FAST, the Fluorinel Dissolution Process (FDP), has not been actively operated since 1988. The FDP facilities were used to convert various spent nuclear reactor elements into a liquid feed solution for subsequent uranium recovery at other ICPP facilities.

The hazardous waste solutions generated in the FSA are only hazardous due to corrosivity. Therefore the waste solutions are treated in elementary neutralization units and are not subject to hazardous waste tank regulations.

To allow for future alternative usage of the FDP facilities the hazardous waste tank systems are being operated as <90-day generator accumulation areas. The wastes originate from various drippans and drains located throughout the facility. The collection points are two tanks in a normally occupied area and two waste tanks with an intermediate sump located within the dissolution cell. As concluded in Reference 1, the portions of the tank systems that do not have secondary containment are 1) the underground sections of the drainlines originating in the chemical receiving, storage, and preparation areas, 2) the sections of two waste transfer lines within the Product/Transfer Vault that
are not doubly contained, and 3) the sump of the FDP cell. The scope of this Integrity Assessment Plan (IAP) is therefore limited to those portions of the waste systems.

INTEGRITY ASSESSMENT APPROACH

The integrity assessment required by RCRA specifies five areas that must be considered:

1. design standards
2. hazardous characteristics of the waste
3. corrosion protection measures
4. documented age of the tank system
5. results of a leak test, internal inspection or other integrity examination.

The integrity assessment for FAST must determine if the underground drain piping and sump have sufficient structural strength and compatibility with the waste to ensure that they will not collapse, rupture, or fail under normal operating conditions. This section describes how each of the areas will be considered in the overall integrity assessment.

DESIGN STANDARDS

The design codes and standards to which FAST was built are well documented in the project documents and drawings. The integrity assessment will summarize the results of a review of the project documentation relative to the design codes and standards.

HAZARDOUS CHARACTERISTICS OF WASTE

The original process flowsheets guided the materials selection for the design. Future alternative uses must be enveloped by the original design basis. Additionally, since the waste tank systems were included on the original RCRA Part A permit various RCRA documents cover the hazardous characteristics of the waste.2,3 These sources of information will be used to address the waste characteristics and the compatibility of the materials of construction.

CORROSION PROTECTION MEASURES

Corrosion protection of the subject ancillary equipment is limited to the selection of corrosion resistant materials of construction, consequently the integrity assessment document will address this area as part of the materials compatibility discussion.

DOCUMENTED AGE OF TANK

The age of the system is known and documented, both in the original project documentation and in subsequent correspondence from the Environmental Department of WINCO. These documents will be utilized to cover this aspect of the integrity assessment.
INTEGRITY EXAMINATIONS

The FDP ancillary piping under consideration are portions of primarily gravity drain systems and as such have limited capabilities for isolation. Consequently, performing a leak test on selected portions of the systems is not possible without adding numerous isolation valves. Performing a leak test of the subject piping by filling the entire system would generate large quantities of mixed waste unnecessarily and would be at odds with waste minimization efforts. Since FAST is a relatively new facility (8-1/4 years old) with a known usage history, it is well suited for an integrity evaluation other than a leak test.

For the piping this integrity evaluation is based on three assumptions. First, any threat to underground piping is internal, not external, i.e., corrosion of the piping will be more severe from the internal contents than from the exposure to the underground environment. Second, that process knowledge is sufficient to determine "worst case" portions of the respective systems. As long as the "worst case" areas are intact the other piping within the system would be intact. Third, that corrosion of the subject systems is uniform.

The first assumption is supported by a knowledge of corrosion mechanisms and the nature of the internal solutions vs. the external environment. The assumption was validated during the integrity assessment of the Remote Analytical Laboratory (RAL), a facility with underground stainless steel drainlines built during the same time period as FAST. The validity of the second assumption will be confirmed as the process knowledge is compared between different lines. If a clear "worst case" section cannot be determined then a statistically determined sampling of piping will be examined for integrity. The third assumption is based on the fact that the drain systems are not subject to turbulent fluid flow conditions with abrasive particles. Therefore erosion at elbows and bends is not a concern. The primary mechanism of corrosion is attack of the pipe wall by the internal fluid. The result of that mechanism is uniform corrosion.

Ultrasonic wall thickness measurements will be taken at locations determined by the "worst case" analysis. The thickness measurements will be compared against original design wall thickness to determine integrity.

The integrity of the dissolution cell sump will be determined by a standing water leak test. Since the sump is in a remote, high radiation area, the leak test is the simplest and most direct way to evaluate integrity. The sump is instrumented with a level detector. A level will be established and recorded. Once the test begins all sources of input will be secured as well as transfers from the sump. As long as the decline over a two week period does not exceed the established evaporation rate the test will be considered successful.

QUALITY ASSURANCE

The ultrasonic testing will be performed by qualified personnel from the Quality and Performance Assurance Department (QA) of WINCO. The leak test of the in-cell sump will be conducted by trained and qualified operators of the
process equipment. The level of quality of the historical data is governed by the formal quality program plan of the project that designed and built the facility, and the quality controls on the operation of the process.

REFERENCES


2. RCRA Interim Status Waste Analysis Plan for the FAST Facility, WAP-FAST, Rev 0, October 1990.

INTEGRITY ASSESSMENT DOCUMENT
FOR THE
FLUORINEL AND FUEL STORAGE FACILITY (FAST)

APRIL 1993

PREPARED BY: C. L. PORTER, SENIOR ENGINEER
ENVIRONMENTAL COMPLIANCE PROJECTS

WESTINGHOUSE IDAHO NUCLEAR CORPORATION
CO-OPERATOR OF THE IDAHO CHEMICAL PROCESSING PLANT
FOR THE
U. S. DEPARTMENT OF ENERGY
IDAHO FALLS, IDAHO
INTEGRITY ASSESSMENT CERTIFICATION
FOR THE
FLUORINEL AND FUEL STORAGE FACILITY (FAST)
IDAHO CHEMICAL PROCESSING PLANT
IDAHO NATIONAL ENGINEERING LABORATORY
IDAHO FALLS, IDAHO

The attached report entitled "Integrity Assessment Document for the Fluorinel and Fuel Storage Facility (FAST)" dated April 1993, prepared by C.L. Porter of WINCO, serves as the basis for this certification, which is required under 40 CFR 265.193 (i) (2) and 40 CFR 265.191.

The certification provided herein by ETAS Corporation is limited to the integrity assessment of the following lines and equipment in the FAST area of the ICPP: 1) the underground sections of the hazardous waste lines draining to tanks VES-FA-141 and VES-FA-142; 2) the sections of the waste transfer lines within the Product/Transfer Vault that are not doubly contained; and 3) the sump of the FDP Cell. ETAS concurs with WINCO's conclusion described in the certification document based on information obtained by them.

Pursuant to the requirements of Subpart J of 40 CFR Part 265, the following statements are made:

"The assessment presented in the attached report indicates that the underground sections of the hazardous waste lines draining to tanks VES-FA-141 and VES-FA-142, the sections of the waste transfer lines within the Product/Transfer Vault that are not doubly contained, and the sump of the FDP Cell are adequately designed and have sufficient structural strength and compatibility with the waste to be transferred to ensure they will not collapse, rupture, or fail.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Stanley A. Heath
Project Manager
4/20/93

James S. Kilburn, ETAS Corporation
Idaho P.E. Registration #4504
8828 North Stemmons Freeway, Suite 413, Dallas, Texas 75247-3726
Tel (214) 630-6680  Fax (214) 630-7494
INTRODUCTION

The Westinghouse Idaho Nuclear Corporation (WINCO) operates the Idaho Chemical Processing Plant (ICPP) for the United States Department of Energy (DOE). Various facilities at the ICPP handle hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). RCRA requires an Integrity Assessment per 40 CFR 265.191 for existing facilities that do not have secondary containment meeting the requirements of 40 CFR 265.193. A Secondary Containment Assessment was performed for FAST to determine those portions of the hazardous waste systems of the facility that required an Integrity Assessment. An Integrity Assessment Plan was formulated for the evaluation of the integrity of the ancillary piping and equipment identified in Reference 1. The results of the testing and evaluation are reported in this document.

SCOPE

Reference 1 concluded that the only portions of the FAST hazardous waste systems that do not have secondary containment meeting the requirements of 40 CFR 265.193 are 1) the underground sections of the drainlines originating in the chemical receiving, storage, and preparation areas, 2) the sections of the waste transfer lines within the Product/Transfer Vault that are not doubly contained, and 3) the sump of the Dissolution Cell. Therefore, the scope of this Integrity Assessment is limited to those three areas.

SYSTEM DESCRIPTION

GENERAL

FAST is located in building CPP-666. The facility is comprised of two separate operating areas, the Fuel Storage Area (FSA) and the Fuel Dissolution Process (FDP) area. The FSA portion is in active operation while the FDP portion of the facility is inactive due to the DOE change in mission. The original RCRA interim status documentation for FAST included two hazardous waste tank systems associated with FSA and three systems associated with FDP. The tank systems associated with FSA have subsequently been reclassified as elementary neutralization units and therefore are not subject to the hazardous waste tank regulations, subpart J of 40 CFR 264 and 265. The hazardous waste tank systems within the FDP area are currently awaiting approval of the RCRA closure plan. Following RCRA closure the units will be operated as <90-day generator accumulation areas. To allow for flexibility in potential alternate applications for the FDP area, the liquid waste systems, although not included in the RCRA Part B Application, are included in the scope of this integrity assessment.
The following discussion will focus on the FDP hazardous liquid waste systems. The operations described, although not currently performed at the facility, envelope any potential uses of the facility, relative to this integrity assessment.

**FDP PROCESS**

The FDP is a batch process which converts spent nuclear reactor fuel elements into a liquid feed solution for subsequent uranium recovery at other ICPP facilities. Typical processing steps which take place within the shielded dissolution cell are summarized as follows:

1. An irradiated Fuel Handling Unit (FHU - one or more pieces of fuel assembled in a fuel handling fixture) is transferred to the FDP cell from FSA; fuel may be placed in an interim storage rack before it is charged.

2. The fuel may be measured for uranium content in the delayed neutron interrogator.

3. The FHU is charged to a dissolver.

4. The fuel is dissolved in the dissolvers with hydrofluoric (HF) acid. Toward the end of the dissolution process, nitric acid is added for final dissolution in complexers. Aluminum nitrate is added to complex free-fluoride ions and to prepare the product for subsequent uranium recovery.

5. After dissolution, all but a small heel of solution is transferred from the dissolver to the complexer. The dissolver is then flushed to the complexer with cadmium containing water for criticality safety. The solution is adjusted for nitrate with additional nitric acid and sampled for uranium and free HF. If necessary, the solution is adjusted for free HF to maintain corrosion control and solution stability.

6. The dissolved product is transferred to the Product Transfer Vessel (PTV). The dissolver and complexer vessels are flushed with cadmium-poisoned water in successive cycles in which the dissolver and complexer vessels are rinsed several times. Each flush is transferred to the PTV.

7. The dissolver product in the PTV is sampled for uranium accountability purposes.

8. The dissolved product is transferred from the PTV to CPP-601 for uranium recovery operations.

**LIQUID WASTE SYSTEMS**

The liquid waste handling system is comprised of three separate systems. The high fluoride liquid wastes are collected in VES-FA-141. The non-fluoride liquid wastes are collected in VES-FA-142. Radioactive liquid wastes are collected in the three vessels in the FDP cell, the sump, VES-FC-184 (Slab
Tank), and VES-FC-147 (PTV). The system contains equipment for the collection of all liquid wastes produced during reagent makeup, fuel processing, and decontamination or cleanup operations. Because the FDP contains no waste treatment or disposal facilities, each of the liquid waste systems includes equipment to transfer the FDP waste to existing ICPP waste treatment facilities.

Liquid wastes handled by the high fluoride liquid waste system are nonradioactive liquid wastes containing either HF or fluoboric (HBF₄). These wastes are collected from FM Area vessels, piping, and pumps used in the HF makeup and feed system. The piping and equipment for this system are primarily fabricated from Hastelloy C-4. The wastes include: out-of-specification reagent solutions that cannot be adjusted to meet process requirements; leaks from FM Area piping, pumps, and vessels; and waste produced when FM Area equipment is drained for maintenance or repairs. All the waste streams drain to two collection headers which drain to VES-FA-141 (see Table 1). Aluminum nitrate is added to VES-FA-141 to complex excess fluoride, limiting corrosion of downstream stainless steel piping and treatment facilities.

**TABLE 1 - HIGH FLUORIDE WASTE SOURCES FOR VES-FA-141**

<table>
<thead>
<tr>
<th>Waste Collection Header</th>
<th>Vessels, Equipment, or Drains</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2&quot;-XW-HC-0528</td>
<td>Scrubber SCR-FH-180</td>
</tr>
<tr>
<td></td>
<td>Scrubber pump P-FH-280</td>
</tr>
<tr>
<td></td>
<td>Overflows from HF Tanks VES-FM-156, -166</td>
</tr>
<tr>
<td></td>
<td>Overflows from recirc/transfer pumps P-FM-256, -266</td>
</tr>
<tr>
<td></td>
<td>Drain line for HF distribution header HF-HC-6064</td>
</tr>
<tr>
<td>2&quot;-XW-HC-1143</td>
<td>Drains under VES-FM-156 and -166</td>
</tr>
</tbody>
</table>

The non-fluoride liquid waste system collects and transfers waste from numerous areas throughout the FDP. These areas include the FM Area, corridor and open area floor drains, and drainage wastes from service sinks located at various levels in the FDP. The drains feed two collection headers which drain to VES-FA-142 (see Table 2).
TABLE 2 - NON-FLUORIDE WASTE SOURCES FOR VES-FA-142

<table>
<thead>
<tr>
<th>Waste Collection Header</th>
<th>Vessels, Equipment, or Drains</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;-XW-AD-0530</td>
<td>6 drains located under walkway (Rm. 114B)</td>
</tr>
<tr>
<td></td>
<td>2 drains in chemical storage area (Rm. 116)</td>
</tr>
<tr>
<td></td>
<td>2 drains in Rm. 114A</td>
</tr>
<tr>
<td></td>
<td>2 floor drains (Rm. 114C)</td>
</tr>
<tr>
<td></td>
<td>1 drain in loading/loadout area (Rm. 115)</td>
</tr>
<tr>
<td></td>
<td>4 drains in the east corridor (one per level)</td>
</tr>
<tr>
<td></td>
<td>4 drains in the west corridor (one per level)</td>
</tr>
<tr>
<td></td>
<td>Utility sink drains in the northwest corridor (3 levels)</td>
</tr>
<tr>
<td>4&quot;-XW-AD-0529</td>
<td>Drains for VES-FM-103, -151, -152, -157, -158, -161, -162, and -167</td>
</tr>
<tr>
<td></td>
<td>Drains for pumps P-FM-201, -204, -251, -252, -257, -258, -261, -262, and -267</td>
</tr>
<tr>
<td></td>
<td>Drain lines for poison water (PW) headers</td>
</tr>
<tr>
<td></td>
<td>Drain for HE-FM-305</td>
</tr>
<tr>
<td></td>
<td>Drain for mist eliminator DM-FM-404</td>
</tr>
<tr>
<td></td>
<td>Condensate drain line from 4&quot;-HS-NC-7575-1</td>
</tr>
<tr>
<td></td>
<td>Drain line from sump pump P-FM-279B</td>
</tr>
</tbody>
</table>

Although the primary function of the PTV is to transfer complexed dissolver product to CPP-601, it also serves as one of two subsystems for handling radioactive liquid wastes. The dissolution cell sump and the sump hold tank or Slab tank is the other. All wastes from the process equipment in the cell are collected in the PTV and transferred to the appropriate disposal system. Other wastes generated in the cell, such as leakage and decontamination solutions are collected in the cell sump and transferred to the Slab tank for sampling prior to transferring them to the process or to CPP-601 for disposal. The wastes are of two general types: those with high fluoride content and those containing no fluoride. Table 3 shows the sources of liquid waste for the dissolution cell sump.
TABLE 3 - LIQUID WASTE SOURCES FOR CELL SUMP

<table>
<thead>
<tr>
<th>Type of Drain</th>
<th>Source of Area, Equipment, or Pump Drains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Drains</td>
<td>Liquid sample cell drains</td>
</tr>
<tr>
<td></td>
<td>( \text{H}_2/\text{O}_2 ) analyzer drain</td>
</tr>
<tr>
<td></td>
<td>Crane maintenance area floor drain</td>
</tr>
<tr>
<td></td>
<td>Waste loadout room, B-4</td>
</tr>
<tr>
<td>Equipment Drains</td>
<td>Neutron interrogator drain</td>
</tr>
<tr>
<td></td>
<td>Transmitter enclosure drains</td>
</tr>
<tr>
<td></td>
<td>Interim storage tubes</td>
</tr>
<tr>
<td></td>
<td>Crane door drains</td>
</tr>
<tr>
<td>Pump Drains</td>
<td>P-FC-216, DOG scrubber</td>
</tr>
<tr>
<td></td>
<td>P-FC-226, DOG scrubber</td>
</tr>
<tr>
<td></td>
<td>P-FC-236, DOG scrubber</td>
</tr>
<tr>
<td></td>
<td>P-FC-247, PTV pump</td>
</tr>
<tr>
<td></td>
<td>P-FC-248, PTV pump</td>
</tr>
</tbody>
</table>

INTEGRITY ASSESSMENT

The Integrity Assessment required by RCRA specifies five areas that must be considered:

1. Design Standards
2. Hazardous Characteristics of the Waste
3. Corrosion Protection Measures
4. Documented age of the Tank System
5. Results of a leak test, internal inspection or other integrity examination.

In accordance with the Integrity Assessment Plan, this section summarizes the consideration of each of the above areas relative to the integrity of the subject piping.

DESIGN STANDARDS

Construction drawings and design specifications for FAST were developed by the Ralph M. Parsons Company, as part of the FAST Project, and approved by the ICPP operating contractor (EXXON Nuclear Company, Inc.). These documents were developed in accordance with the FAST Project Design Criteria (PDC).

Structural requirements of the PDC included a building design life of 40 years and a 20 year design life for the FDP; that all new construction be designed to meet the requirements of the Uniform Building Code (1976 Edition); and that the building, safety related systems, and all essential mechanical equipment and supports be designed to withstand the effects of the design basis natural phenomena as defined in the PDC. The Design Basis Earthquake (DBE) was defined
to have a resultant vertical bedrock acceleration of 0.16g and horizontal acceleration of 0.24g.

Design, construction, testing, and operation of the facility was required by the PDC "To be in compliance with the current DOE-ID Engineering Standards and other DOE, Federal, State, local, and national consensus regulations, standards, and codes...". Piping and valves were designed and installed in accordance with applicable sections of the ASME/ANSI B31.1, "Power Piping".

The Design Criteria, drawings, and specifications, together with the QA Inspection documentation from the construction activity, adequately document that the FAST liquid waste handling systems have sufficient structural strength to ensure that they will not collapse, rupture, or fail under normal operating conditions.

HAZARDOUS CHARACTERISTICS OF THE WASTE

From a materials compatibility standpoint the hazardous characteristics of the wastes that are of primary concern result from the reagents used in the dissolution process. Table 4 provides details of the process solutions:

<table>
<thead>
<tr>
<th>STOCK SOLUTIONS</th>
<th>PROCESS REAGENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>44 M hydrofluoric acid (HF)</td>
<td>HF solvent (13.3 M HF, 10.8 g/l boron)</td>
</tr>
<tr>
<td>2.2 M aluminum nitrate</td>
<td>HNO₃ solvent [13 M HNO₃, 0.214 M Cd(NO₃)₂]</td>
</tr>
<tr>
<td>cadmium sulfate (CdSO₄)</td>
<td>aluminum nitrate solution [2.2 M Al(NO₃)₃, 0.214 M Cd(NO₃)₂]</td>
</tr>
<tr>
<td>13.2 M nitric acid</td>
<td>Cd-poisoned water (heel and rinse water) (0.214 M CdSO₄)</td>
</tr>
<tr>
<td>cadmium nitrate [Cd(NO₃)₂]</td>
<td>zirconium carbonate solution [29% wt ZrO₂, CO₂, 13 M HNO₃, 4 M Cd(NO₃)₂]</td>
</tr>
<tr>
<td>1.8 M zirconium nitrate [Zr(NO₃)₂]</td>
<td>H₂SO₄ solvent (17.35 M H₂SO₄, 0.214 CdSO₄)</td>
</tr>
</tbody>
</table>

*17.35 M sulfuric acid (H₂SO₄)
* only used during cold operation

From a RCRA standpoint the waste codes associated with the tank systems are D002 (pH), corrosive hazard from the acids and D006 (cadmium), toxic hazard. Although the reagents listed in Table 4 may not be the exact solutions used in future alternative uses of the facility they certainly envelope any possibilities. Therefore, they are the basis for the materials compatibility evaluation.
CORROSION PROTECTION MEASURES

Several design and operating features combine to ensure integrity from a corrosion protection standpoint. As detailed in Reference 1, the materials of construction were selected following an extensive materials testing program based on the process flowsheets. The corrosive nature of the reagents was the basis for the selection of respective types of corrosion resistant materials. The systems that handle HF utilize Hastelloy C-4 for the piping. All other waste piping is constructed of 304L stainless steel. The materials selection is supplemented with procedural requirements to complex the free-HF before it is transferred out of Hastelloy C-4 equipment and into 304L stainless steel equipment which is less resistant to HF. Protection from exterior corrosion is provided by corrosion resistant coatings (high density polyethylene) applied to the exterior surfaces of piping in direct buried service. Cathodic protection was also required for underground piping.

The combination of corrosion resistant materials, external corrosion protection measures, and operating procedures ensures that the subject systems will not collapse, rupture, or fail under normal operating conditions.

DOCUMENTED AGE OF THE TANK SYSTEM

The age of an ICPP RCRA Tank System is defined as the date of first service for its intended purpose. This includes initial cold chemical operations. The FDP first operated in December of 1984. Therefore the documented age of the tank systems is 8-1/4 years. The start date is documented in WINCO letter, ECT-25-92, dated September 8, 1992. It should be noted that the FDP process has not been operated since 1988.

INTEGRITY EXAMINATION

As noted in the Integrity Assessment Plan, the FDP has had limited and well known usage since its construction. It is basically a new facility. The initial integrity of the subject waste systems were demonstrated by the initial hydrostatic and pneumatic testing following construction. To confirm current integrity, all of the lines feeding the respective tank systems were evaluated for "worst case" usage. Worst case was clearly 2"-XW-HC-1143 due to the fact that a dolomite plug in the drippan drain for VES-FM-166 occurred in 1989. To clear the plug an aggressive ammonium nitrate/nitric acid solution was used. When the plug was dissolved the line was rinsed 3 times to VES-FA-141. Ultrasonic thickness measurements were therefore taken just below the subject drain and where the pipe is first accessible after exiting from the underground in the overhead of the -31' Level. Attachments 1 and 2 give the results of ultrasonic (UT) thickness measurements. Due to easy access of most of the waste piping additional measurements were taken to validate the assumption that any corrosion would be uniform. Attachment 3 compares the UT results with the nominal wall thicknesses. With the exception of some of the readings on the "worst case" pipe, all readings are within the 12.5% manufacturing tolerance for new pipe or fittings. In the drain region of 2"-XW-HC-1143 a 1% wall loss is indicated. On the 304L side of the transition
from Hastelloy a significant wall loss of about 50% is indicated. Additional readings (Attachment 4) were taken to confirm that a portion of the original 304L piping remained in service when a later modification tied 2"-XW-HC-1143 into 1-1/2"-XW-HC-0528. Since the tie-in required a loop over an adjacent 4" line a P-trap was effectively added to the system. The retention of the 304L section with reduced wall provides a weak link that ensures failure within a secondarily contained area before a failure in the underground portion of piping. This 304L SS section of pipe does not require integrity assessment because it is entirely within the -31' level room, which provides the required secondary containment.

Attachment 5 contains the results of the leak test on the sump. The data shows that the level remained constant, within the accuracy of the level instrumentation, for the two week test period.

CONCLUSIONS

Based on the background information reviewed and summarized in the foregoing sections, together with the results of the integrity examinations, it is concluded that the integrity of the subject piping is sufficient to ensure that it will not collapse, rupture, or fail under normal operating conditions.

REFERENCES


QUALITY INSPECTION REPORT

IR#: IR 93-018
SUBJECT: Drain Line UT Thickness Measurement

Page 1 of:
PROJECT EAW/WORK ORDER/PURCHASE ORDER: W.O. 150104

ADRESSEE:
Tom Byrnes MS-5114

EQUIPMENT/SYSTEM/LOCATION:
VES-FM-152/166 @ CPP-666 Rm-114B

OBSERVATION/DESCRIPTION:

The above referenced work order requested RCRA assessment of VES-FM-152 and VES-FM-166 drain lines using UT thickness measurement. The drains were 2" Hasteloy and 4" 304 SST.

Visual inspection of the drain internals revealed no scale or other associated corrosion products. Liquid was present in both lines in the "P" trap area. The side walls above the trap were dry. UT thickness measurements were obtained using a Panametrics model 260L thickness tester ser.# 0158112 and a 0.20" 10 mHz transducer, model D973 ser.# 129016. The unit was calibrated before and after use using a 304L SST step wedge ser.# 0305 and a Hasteloy C-4 step wedge ser.# 704104. Readings were taken at 90 degree intervals around the inside circumference at 6" depth increments. Reference points were North, East, South, and West. The following measurements were obtained:

2" Hasteloy
6" (N) 0.192 (E) 0.190 (S) 0.193 (W) 0.188
12" 0.190 0.194 0.188 0.188
18" 0.189 0.184 0.186 0.192

4" 304 SST
6" (N) 0.252 (E) 0.241 (S) 0.251 (W) 0.248
12" 0.250 0.252 0.251 0.247
18" 0.253 0.233 0.254 0.249
24" 0.252 0.235 0.250 0.254

Measurements were not taken at the 24" level in the 2" pipe because of concerns of wetting the probe with liquid from the "P" trap.

INSPECTOR/DATE:
J. L. Kline 2/11/93

SUPERVISOR/DATE:
E. [Signature] 3/11/93

ADRESSEE RESPONSE REQUIRED:
[ ] YES [X] NO

ADRESSEE REMARKS/RESPONSE:

DISTRIBUTION: ADRESSEE QE FILE
J. Roberts N. Porter

NCR REQUIRED: [ ] YES [ ] NO

DISTRIBUTION: INSPECTOR

(ADRESSEE/RESPONDER) NAME/DATE:
QUALITY ASSURANCE
ULTRASONIC EXAMINATION REPORT

Inspection Plan No.
NA

Identification
304L & Hastelloy

Material
CH

Type
Sec. 9

Thickness
To be determined

Surface Condition
Factory Smooth

Equipment Type and Number
Pana 26DL S/N 158112

Couplant
Sonotech

Calibration Reference Block No.
0265 / Hastelloy RTSkin

Material Type
NA

Procedure
8.9.6

Scanning Method
Static

Scanning Level
NA

Saddles, Wedges, or Shoes (Where Applicable)
NA

Scanning Mechanism (Where Applicable)
NA

Item/Component Description
See Attached Sheet

Instrument Settings (Where Applicable)

Frequency
NA

Pulse Length/Energy

Material/Sweep Delay

Test Range/Sweep Length

Suppression/Reject

Swept Gain/DAC Curve

Calibrated Gain in db

Uncalibrated Gain

Reject Level/Limit

Reference Level

Tran. Mode

Search Units (Where Applicable)

Brand
Panametrics

Serial Number
128906

Nominal Angle
Normal

Size
0.20"

Nominal Freq. (MHz)
5.0 MHz

Calibration
Start 0900, 1000, 1100
Finish 1230, 1400

Time

SKETCH OF ITEM INSPECTED (Where Applicable)

See Attached Sheets. For Thickness Readings & Sketch of Pipe.

Note 1: All dimensions in Inches

Note 2: Location of UT readings marked on 8.00

Disposition:
Accept
Reject

Acceptance Standard Used
NA

QA Inspector

Level

Date

7/23/92

Remarks:
Thickness Test for Base line Data.

QA Supervisor

Date

Distribution: T. Blend, O.L. Porter, J. F. Keeler
DATE: FEBRUARY 18, 1992

TO: B.J. ARCHIBALD
FROM: C.L. PORTER
SUBJECT: UT MEASUREMENTS FOR FDP INTEGRITY ASSESSMENT

THE HAZARDOUS WASTE LINES AT FDP NEED TO BE ASSESSED FOR INTEGRITY. IN ORDER TO DETERMINE THE AMOUNT OF NOE NECESSARY TO PROPERLY PERFORM THE INTEGRITY ASSESSMENT SOME PRELIMINARY WALL THICKNESS MEASUREMENTS ARE NEEDED. THE INITIAL LOCATIONS ARE SUMMARIZED BELOW:

<table>
<thead>
<tr>
<th>LINE NUMBER</th>
<th>MATERIAL</th>
<th>APPROX. LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot;-XW-HC-121143</td>
<td>HASTELLO Y C-4 SCHEDULE 80S</td>
<td>-31 FT LEVEL WHERE PIPE EXITS WALL</td>
</tr>
<tr>
<td>1&quot;-XW-HC-120519</td>
<td>HASTELLO Y C-4 SCHEDULE 80S</td>
<td>PIPING ON BOTH SIDES OF VALVE V-FO-8058</td>
</tr>
<tr>
<td>1&quot;-XW-HC-120518</td>
<td>HASTELLO Y C-4 SCHEDULE 80S</td>
<td>PIPING ON BOTH SIDES OF VALVE V-FO-8057</td>
</tr>
<tr>
<td>1 1/2&quot;-XW-HC-120528</td>
<td>HASTELLO Y C-4 SCHEDULE 80S</td>
<td>NEAR 121143 TIE-IN AND ALSO NEAR TANK END.</td>
</tr>
<tr>
<td>1 1/2&quot;-XW-AD-121134</td>
<td>304L SS SCHEDULE 40S</td>
<td>JUST PRIOR TO WALL PENETRATION INTO VALVE CUBICLE (-13FT LEVEL)</td>
</tr>
<tr>
<td>1&quot;-XW-AD-128425</td>
<td>304L SS SCHEDULE 40S</td>
<td>SAME AREA AS LINE 121134</td>
</tr>
<tr>
<td>4&quot;-XW-AD-120529</td>
<td>304L SS SCHEDULE 40S</td>
<td>NEAR WALL PENETRATION AND ALSO NEAR TANK END (-31FT LEVEL)</td>
</tr>
<tr>
<td>3&quot;-XW-AD-121145</td>
<td>304L SS SCHEDULE 40S</td>
<td>-31FT LEVEL UTILITY SINK DRAIN</td>
</tr>
</tbody>
</table>

CONTACT TOM BYRNES, 6-3308, FOR SPECIFIC LOCATIONS.

THE CHARGE NUMBER FOR THIS WORK IS 15970-700-131.

PLEASE DOCUMENT THE EXACT LOCATIONS IN THE EVENT THESE MEASUREMENTS NEED TO BE REPEATED IN SUBSEQUENT YEARS.

TO SUPPORT THE CURRENT SCHEDULE FOR THE ASSESSMENT WE NEED THESE PRELIMINARY WALL THICKNESS MEASUREMENTS BY 2/21/92.

cc: T. R. BYRNES
    J. A. DOWALO
    J. E. KAYLOR
### TOP EAST BOT WEST

<table>
<thead>
<tr>
<th></th>
<th>0.352</th>
<th>0.352</th>
<th>0.352</th>
<th>0.350</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.352</td>
<td>0.355</td>
<td>0.354</td>
<td>0.357</td>
</tr>
<tr>
<td>2</td>
<td>0.123</td>
<td>0.092</td>
<td>0.093</td>
<td>0.138</td>
</tr>
</tbody>
</table>

**PIPE 1143**

<table>
<thead>
<tr>
<th></th>
<th>0.299</th>
<th>0.298</th>
<th>0.301</th>
<th>0.301</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.300</td>
<td>0.294</td>
<td>0.300</td>
<td>0.303</td>
</tr>
<tr>
<td>2</td>
<td>0.199</td>
<td>0.197</td>
<td>0.199</td>
<td>0.200</td>
</tr>
</tbody>
</table>

**PIPE 0528**
<table>
<thead>
<tr>
<th></th>
<th>0°</th>
<th>90°</th>
<th>180°</th>
<th>270°</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.135</td>
<td>0.135</td>
<td>0.128</td>
<td>0.130</td>
</tr>
<tr>
<td>2</td>
<td>0.135</td>
<td>0.133</td>
<td>0.131</td>
<td>0.130</td>
</tr>
<tr>
<td>3</td>
<td>0.134</td>
<td>0.135</td>
<td>0.128</td>
<td>0.136</td>
</tr>
</tbody>
</table>

Pipe 842S

<table>
<thead>
<tr>
<th></th>
<th>0.139</th>
<th>0.143</th>
<th>0.146</th>
<th>0.146</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.140</td>
<td>0.147</td>
<td>0.145</td>
<td>0.141</td>
</tr>
<tr>
<td>2</td>
<td>0.141</td>
<td>0.148</td>
<td>0.145</td>
<td>0.142</td>
</tr>
<tr>
<td>Component</td>
<td>Diameter</td>
<td>AVE</td>
<td>Nominal</td>
<td>% Reduction</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------</td>
<td>-----</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>2&quot; HASTALLOY 6&quot;</td>
<td>0.192</td>
<td>0.190</td>
<td>0.193</td>
<td>0.188</td>
</tr>
<tr>
<td></td>
<td>0.190</td>
<td>0.194</td>
<td>0.188</td>
<td>0.188</td>
</tr>
<tr>
<td></td>
<td>0.189</td>
<td>0.184</td>
<td>0.186</td>
<td>0.192</td>
</tr>
<tr>
<td>4&quot; 304 SS 6&quot;</td>
<td>0.252</td>
<td>0.241</td>
<td>0.251</td>
<td>0.248</td>
</tr>
<tr>
<td></td>
<td>0.252</td>
<td>0.252</td>
<td>0.251</td>
<td>0.247</td>
</tr>
<tr>
<td></td>
<td>0.253</td>
<td>0.233</td>
<td>0.254</td>
<td>0.249</td>
</tr>
<tr>
<td></td>
<td>0.252</td>
<td>0.233</td>
<td>0.254</td>
<td>0.248</td>
</tr>
<tr>
<td>2&quot;-XV-HC-1143</td>
<td>0.352</td>
<td>0.352</td>
<td>0.352</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>0.352</td>
<td>0.355</td>
<td>0.354</td>
<td>0.351</td>
</tr>
<tr>
<td></td>
<td>0.123</td>
<td>0.092</td>
<td>0.093</td>
<td>0.138</td>
</tr>
<tr>
<td>4&quot;-XV-AD-0529</td>
<td>0.245</td>
<td>0.243</td>
<td>0.243</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>0.25</td>
<td>0.249</td>
<td>0.247</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>0.263</td>
<td>0.263</td>
<td>0.263</td>
<td>0.26</td>
</tr>
<tr>
<td>1-1/2&quot;-XV-HC-0528</td>
<td>0.299</td>
<td>0.298</td>
<td>0.301</td>
<td>0.301</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
<td>0.298</td>
<td>0.3</td>
<td>0.303</td>
</tr>
<tr>
<td></td>
<td>0.199</td>
<td>0.197</td>
<td>0.198</td>
<td>0.2</td>
</tr>
<tr>
<td>1&quot;-XV-AD-8425</td>
<td>0.135</td>
<td>0.135</td>
<td>0.128</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>0.135</td>
<td>0.133</td>
<td>0.131</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>0.136</td>
<td>0.135</td>
<td>0.128</td>
<td>0.13</td>
</tr>
<tr>
<td>1-1/2&quot;-XV-AD-1134</td>
<td>0.139</td>
<td>0.148</td>
<td>0.146</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>0.14</td>
<td>0.147</td>
<td>0.145</td>
<td>0.141</td>
</tr>
<tr>
<td></td>
<td>0.141</td>
<td>0.146</td>
<td>0.145</td>
<td>0.142</td>
</tr>
<tr>
<td>UTILITY SINK P-TRAP</td>
<td>0.277</td>
<td>0.266</td>
<td>0.226</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td>0.285</td>
<td>0.247</td>
<td>0.222</td>
<td>0.255</td>
</tr>
<tr>
<td></td>
<td>0.264</td>
<td>0.243</td>
<td>0.222</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>0.258</td>
<td>0.262</td>
<td>0.225</td>
<td>0.251</td>
</tr>
<tr>
<td></td>
<td>0.215</td>
<td>0.212</td>
<td>0.213</td>
<td>0.21</td>
</tr>
<tr>
<td>1-1/2&quot;-XV-HC-0528</td>
<td>0.192</td>
<td>0.204</td>
<td>0.196</td>
<td>0.19</td>
</tr>
<tr>
<td>(NEAR VES-FA-141)</td>
<td>0.198</td>
<td>0.198</td>
<td>0.196</td>
<td>0.199</td>
</tr>
<tr>
<td>1&quot;-XV-HC-0519</td>
<td>0.165</td>
<td>0.174</td>
<td>0.165</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>0.168</td>
<td>0.167</td>
<td>0.167</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>0.174</td>
<td>0.174</td>
<td>0.177</td>
<td>0.17</td>
</tr>
<tr>
<td>1&quot;-XV-HC-0519</td>
<td>0.179</td>
<td>0.176</td>
<td>0.176</td>
<td>0.178</td>
</tr>
<tr>
<td></td>
<td>0.175</td>
<td>0.181</td>
<td>0.177</td>
<td>0.177</td>
</tr>
<tr>
<td></td>
<td>0.18</td>
<td>0.18</td>
<td>0.178</td>
<td>0.181</td>
</tr>
<tr>
<td>4&quot;-XV-AD-0529</td>
<td>0.211</td>
<td>0.221</td>
<td>0.227</td>
<td>0.221</td>
</tr>
<tr>
<td>(NEAR VES-FA-142)</td>
<td>0.224</td>
<td>0.23</td>
<td>0.228</td>
<td>0.226</td>
</tr>
</tbody>
</table>

* No reduction below nominal, still within manufacturer's tolerances.
THE ABOVE REFERENCED WORK ORDER REQUESTED ADDITIONAL ULTRASONIC THICKNESS MEASUREMENTS OF 2" XW-HC-1143 PIPING IN FAS TO SUPPORT FDP INTEGRITY ASSESSMENT.

ULTRASONIC THICKNESS MEASUREMENTS AND LOCATIONS ARE ANNOTATED ON THE ATTACHED DRAWING. THESE MEASUREMENTS ARE FOR ENGINEERING EVALUATION ONLY.

THE THICKNESSES WERE OBTAINED USING A PANAMETRICS MODEL 26DL THICKNESS TESTER SER.# 0121405 AND A 0.312", 5MHZ TRANSDUCER MODEL D971 SER.#109139. THE UNIT WAS CALIBRATED BEFORE AND AFTER USE, USING A 304L STEP WEDGE SER.# 0325, AND A HAST. C4 STEP WEDGE SER.# 704104 AND 704105.
<table>
<thead>
<tr>
<th>Loc</th>
<th>Top</th>
<th>Right</th>
<th>Bot.</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.340</td>
<td>.358</td>
<td>.355</td>
<td>.355</td>
</tr>
<tr>
<td>2</td>
<td>.142</td>
<td>.103</td>
<td>.085</td>
<td>.092</td>
</tr>
<tr>
<td>3</td>
<td>.142</td>
<td>.134</td>
<td>.081</td>
<td>.143</td>
</tr>
<tr>
<td>4</td>
<td>.146</td>
<td>.123</td>
<td>.085</td>
<td>.095</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
<td>.224</td>
<td>.225</td>
<td>.241</td>
</tr>
<tr>
<td>6</td>
<td>N/A</td>
<td>.235</td>
<td>.224</td>
<td>.237</td>
</tr>
<tr>
<td>7</td>
<td>N/A</td>
<td>.239</td>
<td>.224</td>
<td>.239</td>
</tr>
<tr>
<td>8</td>
<td>N/A</td>
<td>.231</td>
<td>.229</td>
<td>.230</td>
</tr>
<tr>
<td>9</td>
<td>.221</td>
<td>.218</td>
<td>.218</td>
<td>.221</td>
</tr>
<tr>
<td>10</td>
<td>.217</td>
<td>.223</td>
<td>.220</td>
<td>.215</td>
</tr>
<tr>
<td>11</td>
<td>.221</td>
<td>.228</td>
<td>N/A</td>
<td>.246</td>
</tr>
<tr>
<td>12</td>
<td>.222</td>
<td>.232</td>
<td>N/A</td>
<td>.240</td>
</tr>
<tr>
<td>13</td>
<td>N/A</td>
<td>.247</td>
<td>N/A</td>
<td>.241</td>
</tr>
</tbody>
</table>
1.0 PURPOSE

To conduct a free standing water test of the FDP In-cell sump stainless steel liner for verification that the sumps liner is intact and does not leak. This test is part of the Environmental Integrity Assessment for waste lines and collection sumps at FDP.

2.0 PROCEDURE AND DATA COLLECTION FOR SUMP LINER INTEGRITY TEST

2.1 Record the time, date and current sump level in the appropriate spaces below:

Date: 2-21-92  Time: 1610  Level: 14.1” inches

2.2 Monitor the cell sump level by using LI-FC-076-1 located in the MCR.

2.3 Record the time, date and sump level every 24 hrs. This integrity test will last approximately 2 weeks.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-25-92</td>
<td>1610</td>
<td>14.2</td>
</tr>
<tr>
<td></td>
<td>2-28-92</td>
<td>1610</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>2-29-92</td>
<td>1610</td>
<td>14.2</td>
</tr>
<tr>
<td></td>
<td>2-1-92</td>
<td>1610</td>
<td>14.1</td>
</tr>
<tr>
<td></td>
<td>B-2-92</td>
<td>1620</td>
<td>14.1</td>
</tr>
<tr>
<td></td>
<td>3-3-92</td>
<td>1611</td>
<td>14.1</td>
</tr>
<tr>
<td></td>
<td>3-4-92</td>
<td>1610</td>
<td>14.1</td>
</tr>
</tbody>
</table>

* MISSED READING WAS VERIFIED ON DPOE POINT. 01-19 HISTORY ON DATE AND TIME INDICATED, RECORDED ON THIS LOG 3-5-92 @ 0740.